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ILLUSTRATIONS.

The Bastiat Monument, Mugron, France 1090
Experimental Building: Arcachon Villa, Moor Allerton, Leeds (with Plans).—Mr. Walsh, Architect 1094
New Greek Church, San Francisco, California.—Messrs. Hoehhofer & Apponyi, Architects 1095

CONTENTS.

The Light of the Future 1081
Giorgione's Four Hundredth Anniversary 1083
The Rumoured Extinction of the Eddystone Light, and the Struggle of the Architect with the Ocean 1085
Sanitary Science: a Sketch by Mr. Robert Rawlinson, C.B. .. 1086
Retrospective Architectural Study 1087
The Cleansing of the Thames 1088
The Social Science Congress 1089
The Bastiat Monument, Mugron, France 1090
In Paris this Week 1090
The Work of the School Board for London 1091
Music for the Blind 1092
Town Spoiling Country 1092
Crystal Palace Concerts 1092
Experimental Building: Arcachon Villa, near Leeds 1092
New Greek Church, San Francisco, California 1092
On Some Hygienic Conditions of the Pottery Manufacture 1097
Progress in Purifying Sewage by Precipitation 1098
A New Brick-kiln 1098
Metropolitan Board of Works 1099
Fearful Panic in a Liverpool Theatre 1099
Pianoforte Design 1100
Surveyorship Items 1100
The Paving of London Bridge 1100
New Cathedral at Tuam 1100
Records of Restorations: Architectural Society of the Archdeaconries of Northampton and Oakam 1100
Builders' Benevolent Institution 1101
The Thames Conservancy and the London Sewage 1101
Congress of the Sanitary Institute 1101
Worcester Guildhall Restoration: Alleged Short "Quantities" 1101
Gleanings from Glasgow 1101
New Theatres 1102
Buildings for Poor-Law Administration 1102
Obituary 1102
Enclosure of Antiquities 1102
To Clean Lead 1102
The Obelisk 1103
Sanitary Shortcomings 1103
Arbitrations 1103
Accidents 1103
Masters and Men 1103
Architecture in Germany 1103
Glasgow Institute of Architects 1104
Architectural Association: Syllabus of Papers 1104
Civil Engineers and Double Commissions 1104
Books received: Stanley's Descriptive Treatise on Mathematical Drawing Instruments, &c. (Spon) 1104
Contractors' Claim for Extra Work, Hythe 1105
Paris Exhibition 1105
Church-building News 1105
School-building News 1105
School Board Schools 1106
Miscellanea 1106

The Light of the Future.

IN a former issue* we had occasion to refer to the work of M. Hippolyte Fontaine, "L'Éclairage à l'Électricité," at a time when public interest, in this country at least, in electric lighting had hardly begun to be aroused. Since then the importance of the electric light,—though still almost in its infancy,—has come to be so widely recognised that the appearance of M. Fontaine's work in an English garb ("Electric Lighting." London: E. & F. N. Spon) must be doubly welcome. It has been remarked, and with truth, that few subjects excite public attention to the extent of this question of the electric light. Trials have been made in this country, and on a more or less extensive scale on the Continent, as well as in America. They have taken place on vessels and quays, in dockyards and harbours, on fortifications and in encampments, in railway stations, workshops, theatres, &c. While this shows that the subject is of general interest, it will experience, and has already experienced, all the vicissitudes to which most questions of public utility are liable at their first appearance. On the one hand, enthusiasts have saluted the dawn of electric lighting by proclaiming loudly that it is a hundred times more economical than gas, that it may be employed anywhere and distributed indefinitely, and that its light is as beautiful and intense as the centre of all lumination, the sun itself. By others, at present the majority, who object to change either from habit or on principle, thereby hindering unconsciously or wilfully, as the case may be, the progress all rational minds desire, the service the electric light is destined to render to industry is not appreciated as it deserves. As in all other things, however, so with this important agent: its true value will be found in the mean between the two views. The future may have surprises in store for us; but our present knowledge enables us to confidently affirm that the part electricity is destined to play is far from being fully developed just yet. As time advances, and the elements of electric lighting have been put to more practical purposes, both its partisans and opponents will have had ample opportunity of testing its advantages. Meanwhile, and before considering what the electric light has already done for us, it will not be unprofitable to recall in a few outlines the history of the electric light from its origin.

When Davy, in 1813, first produced the electric light between the charcoal points of two conducting wires, it was at once proposed to use it for all the various purposes of illumination, simply because in volume of light it excelled all other known sources of light. But it became soon evident that great obstacles presented themselves to the general application of this light. Davy had used for its production a gigantic galvanic battery of 2,000 elements; the lengths of charcoal were quickly consumed in the enormous heat of the arc of light, and had to be moved towards each other, if the light was not to be extinguished, in the same degree as they were consumed; and, finally, the light was concentrated upon a small space, the attempt of dividing it into several lights having also failed. A step in advance was made when, using stronger acids, new elements were constructed which gave more powerful currents; it was possible to produce with from forty to fifty of such elements a beautiful electric light; and the efforts were successful of maintaining, by means of the current itself and a clockwork suitably connected with it, the charcoal points at the distance required for the supply of a continuous light for hours without manual intervention. But notwithstanding the great improvement of the galvanic elements, the cost of the light produced by them was still too great, and the management of the batteries too troublesome, for its general practical application for the purposes of illumination to be thought of. Its use was confined to some scientific purposes, and the occasional production of great effects of light in theatres, &c.

Faraday, in 1831, found a new way of generating electrical currents, by moving magnetic poles towards closed wire coils, or *vice versa*, and since then opened out to physicists and engineers a new, wide field to produce by the suitable construction of magnetic machines powerful electrical currents, and with these the electric light without batteries, consequently in a purely mechanical way. Step by step progress was made in this direction, while on the other hand it was tried to improve the electric lamps, with a view of keeping the charcoal rods at the same distance during combustion. Already in 1850, we find both, the magnetic machine and the electric lamp, improved to such a degree as to provoke serious thought of applying the electric light to lighthouses, for illuminating large spaces of ground for war purposes, &c.; and yet it was not until the end of 1863 that the first electric light was shining in the lighthouse of Cap la Hêve, near Havre.

In the meantime, Dr. W. Siemens, of Berlin, already then well known for his eminent services rendered to telegraph engineering, had invented his induction cylinder, and had employed it both for the working of the telegraph and in the construction of a new magnetic machine, small but powerful; and Wilde (1866) undertook to make use of the Siemens machine in combination with a steam-engine of fifteen-horse-power in such a manner as to be able to produce electrical currents and the electric light of a power until then never thought of. But Wilde's machine was very expensive both as regards construction and working, and found but little favour in consequence.*

In the same year, Dr. Siemens discovered the dynamo-electrical principle, or the manner of changing any description of mechanical work without steel magnets into electrical currents. It is well known that there are no different descriptions of forces in nature, but only various forms of one and the same fundamental force, the essence of which is movement, either the movement of larger bodies (mechanical work) or the movement of the smallest particles and the ethereal body of the universe (heat, light, electricity). For that reason it is possible to transform any of these forms of force,—for instance, the muscular power of living beings, steam-power, water-power,—into heat or light or electricity. With this invention of Siemens, galvanic batteries were doomed, and a means offered to engineers of producing electrical currents of a power hitherto unknown, and on proportionately small machines.

Of the various magneto-electric machines that have been brought forward, that of M. Gramme is the most generally used. As soon as his machine became practicable, an English company purchased the English and American patents, the Société d'Encouragement awarded a gold medal to the inventor, and a large number of manufacturers ordered the apparatus. The exhibitor has been awarded prizes at the Exhibitions of Lyons, Vienna, Moscow, Linz, and Philadelphia; and now about 500 machines of his construction, with magnets or electro-magnets, have been delivered, and the demand for them is still increasing. Electric lighting, which before M. Gramme's invention did not exist, speaking industrially, is at the present day within the domain of things practical. It is not within our scope to give a detailed description of his machine; it is sufficient for our purpose to state that it furnishes continuous electric currents, the direction and intensity of which may be changed. The electric current having been generated is conducted through an insulated wire to a perpendicular rod of retort carbon, the point of which is placed exactly above the point of a similar rod, the distance between the points being less than a quarter of an inch. This intervening space is the electric arc, and the current passing through that interval from the rod above to that below heats the points to astate of intense incandescence, producing the electric light. The current passing only in one direction,—from the upper or positive pole to the lower or negative pole,—consumes the positive at double the rate of the negative, and

* See p. 499, *ante*.

* Mr. Wilde has obtained an interim injunction, restraining Messrs. Wells, of Shoreditch, from using the light which (as we reported last week) they have adopted at their premises, on the ground that it involves an infringement of his patent.

consequently the distance between the points has to be continually readjusted by clockwork and a magnet, constituting the regulator or electric lamp.

Davy made use of rods of wood carbon extinguished in water or mercury. They burned with great brilliancy and very regularly, but they were consumed very rapidly, so as to be useless for practical purposes. Now retort carbon, the deposit collected from the walls of gas retorts, is employed. It is much more dense than wood carbon, and resists for a long time the destructive action of the voltaic focus. Here, also, there is room for improvement, for retort carbon is not all that could be desired, but it gives satisfactory results in most of its applications.

The best known apparatus for regulating the consumption of the carbons are those of Archereau, Lacassagne and Thiers, Gaiffe, Foucault and Duboscq, Hefner-Alteneck, and Serrin. The first two are no longer in use.

By the side of the electric lamp with regulating apparatus for the carbon rods as they become consumed, Jablochkoff's candle has also become the material for electric lighting. M. Jablochkoff's light completely suppresses the regulator. His invention was presented to the Academy of Sciences in October, 1876. The carbons, instead of being opposed, are placed side by side, and are separated by an insulating fusible substance. When the current begins to pass, the voltaic arc plays between the ends of the carbons. The layer of insulating matter melts, volatilises, and the double rod of carbon slowly consumes, exactly as the wax of a candle progressively exposes its wick. M. Jablochkoff now burns in his candles, as they are called, powdered asbestos. It seems as if the interesting labours of M. Jablochkoff will have practical result, and that they will increase the domain of electric lighting, for his lamps are now largely used. In Paris, besides numerous larger electric lamps, at the present time, there are burning many Jablochkoff candles, of which we may mention eight on the Place de l'Opéra, twenty-four in the Avenue de l'Opéra, eight on the Place du Théâtre Français, six at the Palais Bourbon along the front facing the Place de la Concorde, seventy in the Grands Magasins du Louvre, eight in the shops of the Belle Jardinière, sixty in the Concert de l'Orangerie des Tuileries, thirty-two in the interior of the Hippodrome.

Returning to the Gramme machine, it appears that the first light machine constructed by M. Gramme fed a regulator of 900 Carcel burners; its total weight was over 2,000 lb. This machine served for a long time for the experiments on the clock-tower of the Houses of Parliament at Westminster. The fault found with this machine was that it became heated, and gave sparks between the metallic brushes and the bundle of conductors on which the current was collected. This, however, has not given rise to any serious inconvenience during five years. M. Gramme's next machine was less powerful, of a power of only 500 burners, and consequently of smaller dimensions. When a current is sent into two regulators, each will give 150 Carcel burners. This apparatus has been introduced on board the *Suffren* and the *Richelieu*, of the French navy; on the *Livadia* and the *Peter the Great*, of the Russian navy; it is employed by several Governments for service in fortified places. This machine is described as excellent, but its luminous intensity is slightly feeble when the atmosphere is foggy; its price, however, is somewhat high. The inventor has improved upon this machine, and constructed one which, when coupled in tension, gives a luminous intensity of 800 Carcel burners at 700 revolutions per minute, and, if coupled in quantity, 2,000 Carcel burners, with 1,350 revolutions per minute. It has been adopted by the French Ministry of War, by the Austrian navy and artillery, by the Norwegian, Turkish, and other Governments. By further simplification, M. Gramme has been able to introduce a machine most suited for industrial purposes, large iworkshops, and large covered spaces.

As has already been remarked, the electric light may be advantageously employed in a large variety of works, for it admits of obtaining a great quantity of light at a small expense. By its means, the loading and unloading of cargoes, the mounting of machinery, carpentry, weaving, dyeing, and similar trades may be carried on by night just as well as in broad daylight. It is necessary, however, to employ two machines, in order that the light of the one should counteract the shades thrown by the other. It has been found by experience that the naked light may be employed, the workmen themselves having asked for the removal of the opal globes which it was thought at first necessary to use. The electric light preserving the tints of colours, this property has been utilised with success by several dyers for standardising their colours by night.

The electric light is most effective for high rooms; when ceilings are of a less height than 12 ft., its introduction becomes more difficult. As a rule, there may be conveniently lighted with a single apparatus about 5,000 square feet of fitters' shops, lathe-shops, tool-shops, and modelling-rooms; half that space in spinning-mills, weaving establishments, and printing-rooms; and about 20,000 square feet of yard, courtyard, dockyard, quay, and open-air works.

In a country like the British Isles, where the safety of the mercantile marine and the navy depends so very much upon the amount of security with which ships may enter ports, and the care bestowed upon keeping up an effective system of lighthouses to warn the navigator against approaching dangerous coasts, the electric light would be sure to prove a welcome auxiliary in effecting those objects; and so in reality it has, being now employed at many of the stations. It renders visible at night, at distances varying from 2,000 to 6,000 yards, objects such as buoys, ships, coasts, &c. The electric light was first applied to lighthouses in 1863. In that year trial was made with an Alliance machine at the lighthouse of La Hève, near Havre, the results being so satisfactory that no doubt all lighthouses would have been provided with the new light if the question of expense had not stood in the way. It has been stated that the electric light is seen at least five miles farther than the oil-light, and that in hazy or foggy weather the range of the light is twice as great with the former as with the latter.

In England, official opinion was at first against the introduction of the electric light in lighthouses, on account of the peril of interruption; but this has been overcome. There are now electric lighthouses, besides those of England and France, in Russia, Austria, Sweden, and Egypt. Everywhere their action is pronounced satisfactory. Hitherto machines of only 200 Carcel burners have been tried; but it is stated on good authority, that the French Administration of Lighthouses are about to experiment with a Gramme machine of 2,000 burners. This machine probably will greatly enhance the advantages, already recognised, of electricity over oil, and will perhaps determine a radical change in the existing illumination of lighthouses.

The lighting of works by night is highly interesting. The Spanish Northern Railway, after trial, used the light as early as 1862 in the works proceeding in the Guadarama mountains. The expense per hour for material consumed was 2·90 francs per lamp; the saving effected upon the use of torches was 60 per cent. The light has also rendered important services in the mines of Guadarama. The air became so vitiated in the workings by the explosion of charges and the combustion of the miners' lamps that the ordinary lamp would not burn. When a Serrin's regulator was sent down, a complete change took place, respiration "becoming as easy as in the open air," the lamps remaining alight. Amongst open-air works may also be cited, as executed by the aid of the electric light, those of Fort Chavagnac at Cherbourg, of the Chemin de Fer du Midi, the reservoirs of Ménilmontant, the building for the *Moniteur Universel*, and, more recently, those of Havre harbour and docks, the Exhibition of 1878 in the Trocadéro, the Avenue de l'Opéra, the Grands Magasins du Louvre, and other establishments.

With respect to the introduction of the electric light on board ships, the experiments carried on on board *L'Amérique*, one of the steamers of the Compagnie Générale Transatlantique, were so conclusive that it seemed as if nothing could oppose the immediate adoption of the electric light on all vessels, for it is satisfactorily proved that the chief number of collisions result from the difficulty which captains experience in estimating the exact position of an approaching vessel. Yet it will be only gradually that the electric light will take possession also of the ocean. Quite recently, the electric light has been introduced into the British Navy. The electric lighting apparatus of Messrs. Wilde & Co., of Manchester, which has been tried on board the *Alexandra*, *Téméraire*, and other vessels, having proved efficient, the order has been given by the Admiralty to supply similar apparatus to the ironclads *Northumberland*, *Warrior*, *Repulse*, *Superb*, *Nelson*, the steel aviso *Iris*, and the despatch-boat *Lively*. For at least two years the introduction of the Gramme machine has been progressing on board the war-vessels of the French, Danish, Russian, and Spanish navies. As far as we know, up to the present time no disappointment has been experienced, and increasing labour will doubtless improve the first arrangements and lead to still better means.

As far as the application of the electric light to military operations is concerned, several Governments have ordered powerful Gramme machines for the defence of fortified places. An apparatus specially constructed for this purpose has been adopted in France, Russia, and Norway. From trials made at Mont Valérien with the apparatus, and a special projector, it resulted that an observer at the side of the apparatus could see objects 6,500 yards distant, and clearly distinguish details of construction at 5,500 yards. M. Gramme has also designed a machine for war-signalling of very small dimensions that may be turned by hand. The French army possesses at present two of these machines.

Very little attention has hitherto been bestowed upon the great service electricity will ultimately render in lighting up theatres and similar places of public resort. Besides the comparative cheapness of the electric light, its use will do away with the expensive fitting-up necessitated by gas. The great drawback to thorough enjoyment caused by the flare and heat of hundreds of gas-flames will be entirely removed. No longer broiled and heated up to almost fever-point, we shall be able to sit in comfort and, more than that, perfect safety against that most awful of all calamities, a fire in a theatre, or even a panic such as quite recently occurred at Liverpool. Panics will be avoided; for people will soon come to know that fire from electric light is impossible. We were forcibly reminded of the great danger to which audiences are now exposed during a recent visit, on a Saturday evening, to the Covent Garden promenade concerts. We pictured to ourselves the scene that would ensue if, during one of those crowded performances, the mass of inflammable material which has been piled up, in addition to what is already stored there,—with the evident endeavour to "decorate" the place,—were to catch fire: it required but a little fancy to conjure up a picture of an Inferno to which nothing was wanting. With the electric light, on the contrary, we should have, instead of a sweltering, gasping multitude, an audience able to enjoy the musical or dramatic fare set before it. As yet, however, little progress has been made in the employment of the electric light inside theatres.

What is said of theatres applies with even greater force to places of public worship. Let any one who doubts this attend on a sultry evening at such popular churches as the Metropolitan Tabernacle, or at Mr. Newman Hall's church, or even the City Temple, where the ventilation is said to have been recently improved. The heat in all those places is simply unbearable; yet people are expected to worship under such conditions.

For these reasons, it seems to us that the reform pointed out will not be long before it is introduced, especially as more perfect machines for producing the light are to be had. In Paris, as appears from the *Builder* of the 14th of September, experiments have recently been made for lighting up the interior of the Opéra, with a view of preserving the paintings with which the walls of the *foyer* are covered. The general opinion expressed was favourable to its employment.

But the electric light has not been a stranger to the stage for some time. It made its *début* in 1846, in the "Prophète," at the Opéra in Paris. At that early time, however, it was only employed to produce the effect of the rising sun. Its success was complete, and since that time it is rarely that a ballet or an opera has been mounted without the introduction of some effect of the electric light. Since 1855 a host of ingenious combinations have been realised by its aid,—rainbows, lightning, reflections of the sun, &c. At the new Opéra at Paris batteries are used, the architect not wishing to locate a steam-motor in any part of the building. At the Opéra in Vienna, where steam is employed throughout, use is made of a Gramme machine, which gives very good results.

These instances, however, are but isolated cases, or special occasions. What we insist on is, that the electric light should be employed throughout the whole house, and we shall not be accused of being too sanguine in this respect when we say that its use for theatres in the near future is a certainty. It is equally certain that a light which emits neither heat nor sulphurous and sooty smoke solves the question of preserving works of art for the future satisfactorily. The discussion which the experiments at the Paris Opéra will give rise to amongst artists, sculptors, and connoisseurs can tend but in one direction, that of the speedy introduction of the electric light also in museums and art galleries.

Among the various electric lights now exhibited in London, the Lontin light deserves especial notice. The Siemens light has proved of great value for the purposes of lighthouses, where great intensity is required. But so far as the illumination of open spaces, streets, and houses is concerned, the choice seems to lie between the Lontin and Jablochkoff lights. Outside the Gaiety Theatre, where the former is used, it puts the gas-lamps completely in the shade in the most literal sense, just as a gas-flame almost extinguishes the light of a tallow candle. The luminous effect of the Lontin light may be observed especially well from the London bridges. Looking, say, from Blackfriars Bridge on a dark night, in the direction of the Strand where the Gaiety stands, a large circle of radiance may be observed. Any one not aware of the fact that electric lamps are shedding their lustre might take it for the reflection of a fire. Visitors to Paris may observe the Lontin light at the Gare Saint-Lazare, the point of arrival of travellers coming to the French capital by the Newhaven-Dieppe route. It is also used at the Lyons Railway Station. The machine by which this light is worked produces a single current or several currents, direct and inverted currents. They may be distributed over several circuits, and several foci may be obtained, as many as thirty-six lights having already been produced. The lights at the Gaiety are worked by a steam engine in the *Echo* office, the wires conveying the current passing under the road; the wires might be prolonged to Covent-garden Theatre, or to Charing-cross, so that all three points might be lighted at once by the same machine. In Paris, the Lontin light has burnt continuously for twenty-one hours.

The promoters of the electric light tell us that the new lighting agent is only meant to supplement gas for certain purposes, where the use of the latter is impracticable or too expensive. This timid statement reminds us of what is reported of George Stephenson, who, when examined before the Parliamentary Committee as to the speed at which he thought his trains would run, diplomatically put it at a very low rate, well knowing at the time that a higher speed would have frightened Parliament into withholding its sanction for his proposed first railway from Stockton to Darlington. Though the electricians who are working for the perfection of the electric light are perhaps not so sure of their ultimate success as the eminent engineer who revolutionised locomotion, everything points to the conclusion that electricity will ultimately drive gas from, at any rate, many of its strongholds.

The question of the cost of electric lighting is such a highly important one, and has given rise to so much discussion, that we recur to it, though we have examined it already at some length on a previous occasion (see the *Builder*, p. 499, *ante*), when it was shown that, even under the most unfavourable conditions, the electric light is certainly below the cost of gas for equal amounts of light. The electric light as used by the London Stereoscopic Company, who employ a Siemens machine, is stated to be three times cheaper than gas, light for light. M. Fontaine calculates the saving with a Gramme machine to be over 22 per cent. Mr. Sprague, who was recently sent to Paris by the Commercial Gas Company to report on the electric light, comes to the conclusion that gas is twice as cheap as the Jablochkoff light. Other gentlemen have given their opinion for or against electric light with regard to its cost. But any unbiassed man not a shareholder or interested in gas companies, who has taken the trouble to look into the matter, will have arrived at the conclusion that the evidence points in favour of the new light. Moreover, as improvements are introduced in the production of the electric light, its present cost will be still further reduced. In fact, it is one of the conditions of its success that the spirit of inquiry and invention should be turned in the direction of reducing the expenses.

Since we last wrote on this subject, considerable progress has been made also in this country on the question of lighting by the electric lamp, as has from time to time been reported. We are gradually becoming alive to the fact that there are other means, besides gas, oils, and so on, for lighting up our thoroughfares and buildings. Gas is no doubt excellent in its way, but it has its great disadvantages. Oils take the place of gas in all cases where its use is out of the question, but on the whole they are now looked upon as "old-fashioned," and may be entirely dismissed in a comparison with the electric light. The advantages of the latter are manifold, among the principal being that a great deal of time is saved in lighting and extinguishing; the light is vastly superior to gas, and is not injurious; there is an absence of noxious smells, both in the production and combustion; the heat in a room, so often unbearable in the case of gas, is scarcely felt; the most delicate colours are preserved; air is not consumed as in the case of gas; there is no chance whatever of explosion, and although the light is so powerful, no accidents have occurred. There is only one drawback to the general employment of the electric light at present.

The great problem which remains to be solved is that of dividing the light in such a manner as to split up its intense brilliancy into separate useful atoms, each of which fractions must be powerful enough to serve for illumination under the same conditions and at least with the same effect as gas. When that is done, but not until then, the electric light will have proved itself a powerful rival to gas. The startling announcement has just been made that Mr. Edison, the inventor of the phonograph, if not of the telephone, has succeeded, in conjunction with Mr. William Wallace, an electrical manufacturer of Ansonia, Connecticut, to have perfected a dynamo-electric machine to such a degree as to make it the very thing wanted. As no details have yet been forthcoming, we prefer to suspend our judgment. It has been laid down as a very wise rule not to disbelieve anything that is not self-contradictory, and never to believe anything, plausible or otherwise, in a hurry; and to that rule we feel inclined to adhere also in this instance. Everything that has been said, up to the present, for or against this new lighting agent leads us to think that, though it would be not merely rash but erroneous to say at once that the days of gaslighting are numbered, it would be idle to try to disguise the fact that a formidable rival has arisen in the electric light. The latter, while it may yet take years to bring to such a state of perfection as will render it as practically available as gas, is destined, we have no doubt, to be "The Light of the Future." Gas will, nevertheless, long be a valued and well-paid-for servant.

GIORGIONE'S FOUR HUNDREDTH ANNIVERSARY.

On the 5th inst., at the picturesque Venetian town of Castelfranco, was unveiled, on the occasion of the fourth centenary of the birth of Giorgione, a statue to the great painter, and with it a commemorative stone to the memory of those patriots who have fallen in this century for the noble cause of Italian independence,—an exquisite thought, the celebration of the glory of Fatherland in the apotheosis of art and liberty.

The old town was crowded with visitors from all the neighbouring cities, anxious to assist at a ceremony which the municipality wished to render, and with reason, as solemn and as imposing as possible. Towards eleven o'clock the crowd gathered round the quaint old Loggia del Mercato, with its heraldic decorations, before which rose, still enveloped in its veil, the statue of Giorgione. Shortly afterwards, the guests of honour, consisting of many important personages from Venice and from Treviso, the deputies and authorities of the province, left the Municipio, and a few minutes later, on the signal being given, the curtains fell aside, displaying to the applauding crowd the statue of Giorgione, representing him in all the perfection of his youth, his familiar face with its long hair, and his manly figure in the costume of the splendid period which he so nobly adorned. The painter, who has raised his head in the attitude of observation, holds in one hand the chalk (*matita*), in the other his drawing-board, while at his side on a stool are his paint-box and palette, common-place enough accessories, but indispensable in the statue of a painter. He is dressed in the picturesque costume of the fifteenth century (the *quattro cento* of the Italians), the costume rendered with such beauty of colour in the pictures of Gentile Bellini and Carpaccio. From the characteristic *berettino* escapes the thick luxuriant hair, falling on his shoulders; the doublet is slightly open at the neck, and from the slashed sleeve appears the beautifully puffed shirt—the *cami ia a sbuffi*—of the period, while from the left shoulder falls to the ground an ample and long mantle.

More than usual credit is due to the Venetian sculptor, Signor Benvenuti, for having thus recalled Titian's famous contemporary.

The speeches usual on such occasions succeeded the ceremony of the unveiling; among these, however, was specially noteworthy the discourse of the Barone Cattanei, representing the municipality of Venice, giving in the name of that city, as "the mother of the artist," a salutation to Castelfranco, "the mother of the man." Equally graceful was the speech of the mayor of the town, who, after thanking his guests, continued:—"Others will speak to you of Giorgione, whose fourth centenary all Italy celebrates to-day; others will tell you of those devoted patriots, who, in their glowing desire for liberty, shed their blood, and scattered with their bones more than one battlefield; to me is reserved only a modest share, but none the less agreeable, that of greeting in you, those noble citizens of this benign land, who in joy and in grief, in glory and in defeat, had ever before them but one thought, that of building up a Nation!"

At a later hour, and previous to the banquet, the guests visited the cathedral, there to admire the *pala* or altar-piece, the Madonna enthroned, and Saints Liberale and Francesco, the masterpiece of Giorgione, of which we have in our own National Gallery, and once in the possession of Samuel Rogers, the side of whose mantelpiece it adorned, the study for the gorgeous knight in armour.

In the evening, the houses, the gardens, and the quaint towers of the town were fantastically illuminated, the Bengal fire played in fitful light and shade on the statue, and over all, in the clearest of October skies, rising above the dark ivy-covered walls, the cold rays of the moon, enveloping in her mysterious light the whole. And so the evening's illuminations and the traditional fireworks ended a week's rejoicing in honour of the great master,—a rejoicing to which, and to the vintage which has already commenced, friends and relations from all parts had been invited,—sisters and cousins, from Venice, from Padua, and Vicenza, from Treviso and Verona, fair apostles bearing into these remote parts the gospel of the latest fashions, to provincial traditionalists, who still, as in the days of Giorgione himself, add a beauty to their fair features by powdering their hair.

For many weeks past, the municipality has been making preparations for the great event, preparations carried out thoroughly in the spirit of the graceful,—a title that Castelfranco has long borne. The evening previous to the ceremony the final touches to the whole were given, and as the sun of one of the finest of imaginable autumn days went down, the sweeping and cleaning of the old town was at last ended, the water in the still existing moat that surrounds the high and ruined walls, which had been allowed to run off through the sluices, the same that served in the old feudal days, flowed in again and round the base of the statue of Giorgione, situated on a rock in its midst.

Here, at a few yards from the spot where he was born, and no great distance from the cathedral where hangs his noblest work, under the shadow of the mediæval walls, the glory of whose colour he had studied in his youth in their warm contrast to the iridiscent distant hills, the Cadore hills, where Titian first breathed his aspirations, Giorgione's statue stands. The evening previous to its unveiling, and shortly before the sun set, the curtains were momentarily drawn aside to allow,—strange revolution of time,—the photographer to do his work; an hour later, in the twilight, the reflection of the re-draped statue might have been seen in the moat, the reality standing out against the dark background of ivy-covered walls.

For no town more than Castelfranco could be found, or even imagined, so exactly picturing the ideal birihplace of a painter, and such a painter as Giorgione. The flat tiled roofs, the decorated *loggie*, and the narrow streets, tell of a time long gone by, the quaint city gates, above the principal of which still grins the lion of St. Mark,—one of the few remains that tell of the once powerful republic, which Napoleon shattered at a blow,—the emblem was placed too high for his soldiers to destroy; but in many a village and town in the neighbourhood may still be seen embedded in the walls half effaced the winged lion of St. Mark. In more than one town, as at Bassano, still stand the pedestals of the *pili* or flagstaffs from which floated on the festa days the Venetian banner; but now even these are neglected, and nothing but tradition remains to tell of the power of the renowned republic.

But on this especial evening the artistic world of Venetia seemed to be represented, from its most favoured painters, sculptors, and architects, down to the humblest musicians, who crowded in numbers the old *cafés* and *osterie*, where might be heard, if not in all the ancient vigour, still the improvisatore, who chanted his amusing rhymes to the delight of crowded audiences, our own Northern appearance inspiring the poet with an appropriate couplet.

Untouched by succeeding generations, its red-brick castellated walls and turrets improved by the devastations of time, uninjured by the fortifying mania of the sixteenth century, Castelfranco, with more than one town in its neighbourhood, has remained such as it was in the fourteenth, and even earlier centuries, such as Giorgione saw in his boyhood, the home where were passed the early years of his too short existence.

His history is as simple as his life. Little known and obscure, hovering between a dream of art and a reverie of love, Giorgione was essentially the ideal hero of romance. With the grandeur of his features and his figure (a figure made familiar to us by his superb knight in armour) he was so admired, so tradition tells us, that all the *belle donne* of his time fell under the influence of his fascination.

"Of exceedingly humble origin, he was not, therefore, not noble," tells us old Vasari, and he certainly appears to have taken proudly his place among the proudest, in many of whose, what we would now call "vices," he freely indulged.

History tells us how, in the lovely moonlight nights of Venice, stretched on the soft cushions of a gondola, he used to sing, accompanying his "divine" voice with his lute, like the troubadours of old, uttering sweet sounds, and producing harmonious chords, ravishing the ear and soul. For it was at Venice, in the land of dreams and memories sublime, that after his elementary studies at the town from which we are at present writing, the young Giorgione, under Gian Bellini, made the first essays of his art, so soon to be succeeded by such innovations,—innovations in which he fairly rivalled his great co-disciple Titian.

Disdaining the timid and conventional art of his master, as wanting in inspiration and in genius, with a firm touch, full of nerve, free as his own nature, he blended happily in his perfect production the beautiful with the real. His canvasses glow with life, his figures are grandiose, the landscape rich in light and shade, the touch free and determined. In the present day, of his extraordinary *a fresco*, alas! only fragments remain, but his few canvasses are still preserved for us after the lapse of four centuries in all the brilliancy of their colouring, in all the strength of their tints, in all the richness of their execution, produced—greatest miracle of the famous Venetian school—with a palette consisting of but four colours.

Ongania of Venice has published at the momoment a small volume, printed in beautiful Elzevir type, containing two interesting monographs extracted from the "Bulletino d'Arti e Curiosità Veneziane"; one, edited by Signor Urbani de Gheltof, is a careful article from historical authorities on the house in which Giorgione lived when at Venice, and containing an illustration taken from a photograph of a group of children painted in fresco by the master on the Palazzo Valier. The other, the work of the Avvocato Molmenti, is a short and critical biography of Giorgione, accurate in its historical details and artistic in its gracefulness. Among many curious passages one is specially interesting,—a commission which the young painter received from "Messer Aluixe di Sesti for four framed pictures of the life of Daniel, to be painted in good colours on linen canvass." This document, in sad condition, was ferreted out by the author, so he tells us, from the dusty arsenal of an antiquary in Venice.

In Giorgione all is grand, as he himself is grand,—*il grande Giorgione*. What a mind must his have been, to judge from the nobleness of his creations, their originality, their invention; and yet it is said that he suffered from envy because of the praises given to his "rival." Such great natures are incapable of envy; they feel too much their own value; the stimulus of doing nobler works, and the knowledge of their own ability, is their safeguard from passions which alone afflict the powerless, whose hand droops because their mind has failed first of all.

Had but Giorgione lived a few more lustres; if a premature death had not snatched him away, to what height might he not have risen, what masterpieces might he not, like Titian, have left behind him! For in the few pictures that we possess by Giorgione how striking is the difference between their conception and that of his predecessors' works. How strongly is manifested the spirit of the innovator. To him belongs, with his friend Titian, the merit of having smoothed a rough path, the glory of having shown his contemporaries unexplored worlds of fancy. Giorgione truly was, with Titian (whose fourth centenary will also soon be celebrated), the greatest figure in an important phase of the revolution of art, and Vasari, who understood this, truly says that Giorgione was born "to add a spirit to humanity and contrast the freshness of live flesh and blood."

Jolting from its rut the old system, Giorgione, in his figures, preserved the firm outline without displaying the peculiarities and mannerisms that still lingered with the older masters; he displayed a whole new future for art, a whole new science of effects; imitators he had many, but rivals never, for genius rarely has successors.

In the same way that he opened up to future painters the glorious methods of successfully dealing with light and shade, he seems to have established an ideal of an artistic life to the many artists who have since endeavoured to emulate him. Certainly to that French school of romantic painters and workers in the ideal world, which may be said to have originated during the lifetime of one great man who still lives, and whose "Hernani," fifty years ago, inoculated the Parisian students with an enthusiasm for romantic art (and this enthusiasm for Victor Hugo at the present moment exists in as high a degree as ever) which has borne the most glowing fruits that the world has known since the days of Giorgione and Titian.

Glorious as was the promise of Giorgione's life, its end was sad. We are told how his whole existence was divided between two deep loves,—his art and his Cecilia,—the source of each inspiration, the model of every study. In devouring the beauty of his *innamorata* his genius glowed, his sublimest conceptions were brought forth, from his lute flowed the sweetest melodies.

But his beauty (old, old story), careless of fame, fled to the arms of a new admirer, leaving the painter abandoned to die of passionate grief. Betrayed by his pupil and companion, no longer he seized his brushes, no longer he touched the chords of his lute, but, heartbroken, he wrote to the *bella infida*:—

"O mia diletta,
Cecilia, vieni;
Il tuo t'aspetta
Giorgio. . . ."

And so Giorgione died, at the age of thirty-three, alone and lovelorn, at the height of all his glory.

Treviso.

Milland Church, which has been distinguished in ecclesiastical reports as one of the worst and most inefficient in England, is about to be replaced by a new Gothic building, the foundation-stone of which was laid on Saturday last by Mrs. Durnford, the wife of the vicar. The site has been presented by Sir John Hawkshaw, and although the district is comparatively a poor one, the building-fund now amounts to 2,600*l.*, leaving about 1,000*l.* yet to be raised to defray the cost of the intended building, which is to be erected in Bargate stone, from the designs of Mr. William C. Street, the contractor being Mr. Pink, of Godalming.

THE RUMOURED EXTINCTION OF THE EDDYSTONE LIGHT,

AND THE STRUGGLE OF THE ARCHITECT WITH THE OCEAN.

There is no edifice in Great Britain any sudden disaster to which would be more immediately and widely felt throughout the island than the Eddystone Lighthouse. Thus when the rumour spread through Plymouth and Devonport, sped thence by telegraph to other ports and principal towns, that the light on this sea-girt tower was no longer to be observed, the alarm and disquiet were intense. At Penlee point, from which the Eddystone light is usually most conspicuous, it was obscured on the 9th or 10th current. It has since been distinctly observed from the Hoe, and from other points, and it is probable that the temporary blinding of its ray was due to the great waves which, with certain winds, leap from their contact with the precipitous rock,—the Eddystone,—far above the 70 ft. at which the lantern is fixed.

Many causes concur to produce the strong feeling of national pride with which the great work of Smeaton is regarded. No church or chapel would have been regarded, in times when men devoted their lives and their wealth to the building of cathedrals and of abbeys, as of a more truly religious character. A ferry or a bridge was held, in the Gothic centuries, to be a work of piety. But no ferry, bridge, harbour, hospital, or public building of any description within our shores has been the means of saving more human lives, or averting more human misery, than the noble sea lanterns that guard our coasts. As a matter of design the building of the Eddystone lighthouse inaugurated, as Sir John Rennie declared, a new era in masonry. A contemporary which is almost alone among the daily papers in respect of the familiarity which it displays with the rudiments of structural and mechanical knowledge, is not quite correct in saying that the method which Smeaton first introduced has been followed ever since to the minutest detail of measurement. A different principle was introduced by Mr. Stevenson for the Bell Rock Lighthouse, and one which was so far an improvement that it made the stability of the structure dependent only on the durability of the stone employed; while in the Eddystone the durability of iron,—a far less certain safeguard,—was relied on. But the Eddystone was the first great model. It was the first outcome of the architectural genius of England in lighting our sea paths, when the circumstances were those of extreme peril and difficulty. Taking his guidance from the form of a forest tree, Smeaton rooted a stone bole to the live rock, and raised his lantern in the air at a height that might well promise to soar above the highest leap of the wave. Nor was it skill and perseverance alone that were needed for the task. The adventurous builders had to work with their lives in their hands. The size of the base of the tower was limited by the small surface of rock that was left bare by the tide in those unusual intervals when the sea was not washing over the spot. Twice had a light been fixed on the Eddystone, and twice had it been swept away, before Smeaton undertook his task. The wooden turret erected by Winstanley disappeared, together with its architect and watchers, in the great storm of 1703. A successor, built of wood on a stone base, was burned a few years later. The force of the sea in that neighbourhood may be conceived of from the fact that during the great storm of February, 1838, several of the largest granite blocks of the Plymouth breakwater, weighing from three to eight tons each, which were squared and dovetailed together, and embedded in good cement for their whole depth, forming a portion of the finished surface of the work, were torn from their position, and projected over the breakwater into the Sound. It is probable that pneumatic action was, in this case, superinduced by the motion of the waves. In 1840, during a storm, the sea-door of the Eddystone Lighthouse was forced outwards, and its strong iron bolts and hinges were broken by the atmospheric pressure from within. Mr. Walker, the President of the Institution of Civil Engineers, was of opinion that the sweep of the vast body of water in motion round the lighthouse had created a partial and momentary, though effectual, vacuum; and thus enabled the atmospheric pressure within the building to act upon the only yielding part of the structure. Mr. Thomas Stevenson, of Edinburgh, has been long engaged in making observations on the force of

waves, by means of a dynamometer. He has come to the conclusion that a wave 30 ft. high may exert a pressure of very nearly a ton on each square foot; and that, when reflected from a flat surface, such a wave would nearly double its weight. In a situation exposed to waves suddenly striking a vertical surface, more than 3,720 lb. per foot, or 1⅔ ton, displacing pressure, might be exerted. Mr. Scott Russell, who has, as is well known, given much study to the form of wave-lines, recommends cycloids of different orders for the outline of works which are intended to offer the least effectual obstacle to the sea, that is to say, to stand best, as most readily deflecting the wave. The common cycloid has the defect of transferring the force of the waves to the top of the wall, and thus sending a huge body of water into the air. The curtate cycloid, on the other hand, throws the crest of the wave over on itself. If the quality of the materials and workmanship are of the very best order, and the cost is unlimited, such a form may keep down the crest of the wave, and even turn one half to act against the other half. But unless the height of the work be very great, a wave might come large enough to carry off coping and parapet together. Mr. Scott Russell's investigation has been pursued rather with reference to sea walls than to lighthouses. The curved form of the latter edifices, on plan, tends to diminish the force of the wave by allowing it to divide around the shaft at the same time that it ascends against it. Thus, the actual quantity of water that gains the highest point, where, with the curtate cycloid section, it exerts its most destructive energy, will be very much less than that which commences its leap from the base of the tower. It is evident that, where the forces are so great, and the effects of even slight changes in the mathematical form of a curve are so serious, the experience of structures that have showed such endurance as the Eddystone is of primary value to the architect.

The Trinity House have for several years been anxious as to the stability of the Eddystone Lighthouse. During heavy storms from the westward, more especially from the west-south-west, great tremor is felt with the impact of each wave. Mr. James Nicholas Douglass, engineer to the Trinity House, has lately contributed a short paper to the transactions of the Institution of Civil Engineers, giving some particulars of the tower which it is now intended to erect. The present tower shows signs of yielding to the fury of the waves, and the joints of the masonry have more than once yielded to the heavy strain, so that the sea-water has been driven through them to the interior of the building. On two occasions, the first in 1839, and the second in 1865, the upper part of the building has been repaired or strengthened, and strong wrought-iron internal ties have been introduced, extending from the lantern downwards to the solid basement of the tower. On the last occasion, Mr. Douglass says, it was found that the chief mischief was caused by the upward stroke of the heavy seas acting on the projecting cornice under the lantern-gallery, which lifted the portion of the building above that level. This is in accordance with what we have previously remarked, and is a very clear indication that, in the supposition that a projecting cornice of some kind is found to be indispensable for the protection of the lantern, a properly defined curve should be continued from the shaft of the structure round the underside of the cornice, so as to turn over the wave gradually, instead of presenting a flat surface exposed to the lifting power. In Mr. Douglass's design for the Wolf Rock Lighthouse this consideration appears to have been present to the architect. The under-side of the cornice curves gently from the line of the tower, and though there is a square projection of the abacus, it is so protected by the curves as to offer but little resistance to the upward movement of the wave. In 1865 the projection of the cornice of the Eddystone tower was reduced about 5 in., and the stones were fresh bolted together. No further serious leakage has since occurred at that part of the lighthouse. But the portion of the gneiss rock on which the tower is built has been so shaken by the action of the sea, whether on the rock or on the tower itself, that it is now considerably undermined at the base. It has therefore been prudently determined to erect a new lighthouse, at a distance of about 127 ft. from the existing tower. A good foundation has been found, near low-water level.

The present lantern exhibits a fixed white light at an elevation of 72 ft. above high water, which is clearly visible for a distance of about fourteen nautical miles. In 1818 Mr. Robert Stevenson, the Engineer to the Board of Northern Lights, had the opportunity of making a very careful inspection of the rock, being favoured with a smooth sea and a low tide. He had examined it five years previously. He then reported (in 1818),—"The rock is shaken all through, and dips at a very considerable angle, perhaps one in three, towards the south-west; and, being undermined on the north-east side for several feet, it must be confessed that it has an alarming appearance. I am not, however, of opinion that it has altered its state, perhaps, since the date of the erection of the tower. Since my last visit in 1813, I am not sensible of any change in it. On the north-east side, however, at what is called the "Gut" landing-place, where the men sheltered themselves from the fire of Rudyerd's lighthouse, but especially at low water of spring tides, there is a hollowing of the rock which penetrates at least to the circumference of the base of the lighthouse. I therefore conclude that when the tide runs high there is danger of this house being upset, after a lapse of time, when the sea and the shingle have worn away the rock to a greater extent. Nothing preserves this highly important building but the hardness of the rock and the dip of the strata; but for how long a period this may remain no one can pretend to say." Furnished with this advice, from one of the soundest and most provident of the engineers of Great Britain, and able to ascertain how far the hollowing predicted by Stevenson has advanced, Mr. Douglass has had data on which to advise the Trinity House, and there can be no doubt of the soundness of his advice.

The focal plane of the present light we have stated to be at an elevation of 72 ft. above high water; 68 ft. of which height was composed of masonry, the 11 ft. at the bottom being solid. The Bell Rock Lighthouse, built by Robert Stevenson in 1807-11, was founded on a rock so low in the water that during the first season in which the works were carried on,—the season of 1807,—only an hour or two's work could be caught at each tide, and the whole time thus available amounted to no more than thirteen days and a half of ten hours each. The tower of the Bell Rock is 100 ft. high, and the solid portion of its base 21 ft. high. The floors of the Eddystone tower were constructed of a vaulted form, and the haunches of the arches were bound together with chains to prevent them forcing outward to the injury of the walls. But each stone of the Bell Rock floors was made to form a part of the outward walls, extending inwards to a centre stone. Independently of this, they were connected together with copper bats, with a view to preserve their square form at the extremity, instead of dovetailing. The stones were also modelled with dovetailed joggles across the joints. Mr. Smeaton followed the construction adopted by Sir Christopher Wren in the dome of St. Paul's. Mr. Stevenson found no difficulty in procuring stones of the large dimensions necessary for this method of building from Mylesfield quarry; and has the credit of being the inventor of this mode of building a continuous inner structure of absolute solidity and durability.

The new Eddystone Lighthouse is to have the focal plane of the light at an elevation of 130 ft. above high water. The range of the light will be thus extended from 14 to 17½ nautical miles, so as just to overlap the range of the new electric lights on the Lizard. The tower will be constructed of granite. It will have a cylindrical base, 44 ft. in diameter and 22 ft. high, having its upper surface 2½ ft. above high water of spring tides. From this base will spring the shaft of the tower, 35 ft. 6 in. in diameter at the commencement, and 18 ft. 6 in. in diameter under the cornice, the top of which will be 138 ft. above the rock. The tower is to be a concave elliptic frustrum the generating curve of which has a semi-transverse axis of 173 ft., and a semi-conjugate axis of 37 ft. Around the base of the tower, on the top of the basement cylinder, will be a level margin 4 ft. 3 in. wide, for a landing-platform. The tower is to be solid, with the exception of a water-tank, to the height of 25 ft. 6 in. above high water, spring tides. At the level the walls will be 8 ft. 6 in. thick, gradually diminishing to 2 ft. 3 in. at top. The tower will contain nine apartments, the two lower ones 10 ft., the seven upper each 14 ft. high. The whole of the work is to be dovetailed and cemented, both horizontally and vertically, on the system already adopted at the Hanois, Wolf, and Longships Rock Lighthouses. The total net quantity of granite in the work will be about 69,100 cubic feet, and the cost is estimated at 78,000*l.*

In speaking of this great work in the unconditional future tense, it must be remembered that the brief and modest account, given by Mr. Douglass, from which we derive our information, is not the theme of a novice. The writer has undergone the baptism, if not of fire, of sea and storm, and has shown himself a worthy member of the noble band who are content to rank Smeaton as their leader. In 1869 Mr. Douglass completed his fine work, the Wolf Rock Lighthouse, and the light which was then first exhibited on the 1st of January, 1870, has since been continued every night with regularity from sunset to sunrise. An account of this work was read to the Institution of Civil Engineers on the 1st of March, 1870. It called forth the testimony from Captain Owen that, having been acquainted with all the proceedings of the Messrs. Douglass in connexion with lighthouses, he was struck with the modest way in which the proceedings in the erection of the Wolf Rock Tower had been narrated by Mr. J. N. Douglass. Having been personally interested in the building of the Bishop and Wolf Rock Lighthouses, Capt. Owen bore his testimony to the qualifications of Mr. Douglass, not only as an engineer, but as a blacksmith, a carpenter, and a mason in his own person, as well as a seaman. If young engineers wanted to emulate such success, they must, in the same way, know how to take the tool out of the hands of the workman, and to put it to its deftest use. No site or position for a lighthouse, was the testimony of Mr. G. R. Stephenson, required more skill, or involved more difficulties and dangers, than the Wolf Rock. Situated about twenty-three miles W.S.W. of the Lizard Lighthouse, and twenty-one miles E. by N.¼N. of St. Agnes Lighthouse, on the Scilly Islands, this rock rises, in its highest part, 17 ft. above low water of spring tides, which here rise 19 ft. The rock is composed of a hard felspathic porphyry. The surface is rugged, and landing on it is at all times difficult. The depth of the water close to the rock is about twenty fathoms on all sides except the south-east, where a shoal extends for some distance, having only from four and a half to five fathoms of water on it at the distance of a cable's length from the Wolf. At the distance of a mile from the rock in this direction the depth of water on this reef is about fourteen fathoms, but in every other direction it is not less than thirty-four fathoms. Between the periods of high-water and the following low-water, the tidal stream here runs south-easterly, southerly, and south-westerly. From low-water to the succeeding high-water it sets north-westerly, northerly, and north-easterly. This peculiarity is supposed to extend to a radius of four leagues around the rock. Situated as the Wolf is in deep water, and exposed to the full force of the Atlantic Ocean, a terrific sea beats on it. In 1823, the question of building a lighthouse on it was raised by the Admiralty, and Mr. Robert Stevenson, the Engineer to the Commissioners of Northern Lights, then estimated the cost at 150,000*l.*, and the time required for its erection at fifteen years.

From 1836 to 1840, Mr. John Thursburn, a pupil of Mr. James Walker, was engaged in fixing an iron beacon on the Wolf Rock. The difficulties of the undertaking may be estimated from the account of the number of hours actually worked on the rock during each season in the erection of this beacon, which were as follows:—

1836	39½	hours.
1837	65	„
1838	85	„
1839	68½	„
1840	44½	„

Total, in five years, 302½ hours of work.

The cost of the erection of this beacon was 11,298*l.*, or rather more than 37*l.* 6*s.* 8*d.* per hour of actual work. The mast of the beacon, which was of old English oak, 12 in. in diameter, was carried away in November, 1840. It was replaced by a wrought-iron mast, 7½ in. in diameter, by August, 1847. In the succeeding winter this mast was bent 3 ft. from the perpendicular by the force of the heaviest seas driving from the westward; and in October, 1844, it was broken off about 4 ft. above the top of the cone on which it was fixed, by a violent storm. In August, 1850,

another wrought-iron mast, 9 in. in diameter, and bearing a globe of 3 ft. in diameter was fixed, and contested the force of the sea until it was replaced by the present lighthouse.

In 1861 the late Mr. James Walker, Engineer to the Trinity House, was called upon for plans and estimates for the erection of a lighthouse on the Wolf Rock. A site for the workyard was taken, in 1861, at Penzance, 17 miles from the Wolf; and Mr. James Nicholas Douglass, who furnished the account from which we take the leading particulars, and who was then completing the Smalls lighthouse, was appointed Resident Engineer. The tower is very similar to those erected for the Bishop, the Smalls, and the Hanois Lighthouses. It is 116 ft. 4 in. high, 41 ft. 8 in. diameter at the base, and 17 ft. diameter near the top, at the springing of the curve of the cavetto under the lantern gallery. The work is quite solid for 39 ft. 4 in. from the base, with the exception of a tank for fresh water. The walls are 7 ft. 9½ in. thick at the level of the entrance-door, and gradually diminish in thickness to 2 ft. 3 in. near the top. The shaft of the tower presents the outline of a concave elliptic frustrum, of which the generating curve has a major axis of 236 ft., and a minor axis of 40 ft. The tower contains 44,506 cubic feet of granite, weighing 3,296 tons; and its centre of gravity is 36 ft. 2½ in. above its base. Each stone is dovetailed both vertically and horizontally, according to the system first suggested by the father of the Resident Engineer, and first adopted at the Hanois Lighthouse in Guernsey. A raised dovetailed band, 3 in. in height, is left on the top bed and end joint of each stone, a corresponding dovetailed recess is cut in the bottom bed and end joint of the adjoining stones, with just sufficient distance to allow of setting. The whole is put together with Portland cement; and experiments on the strength thus acquired have led to the opinion that the work thus executed is as solid as if it were a granite monolith. In addition to the dovetailing, two yellow metal bolts, 2 in. in diameter, are let into the twenty lowest courses of the tower, for the face stones, and 2 in. bolts of galvanised puddled steel are let into each stone in the interior work. The masonry to the level of the high-water spring tides was set in Medina Roman cement, mixed with salt water. Above that level, Portland cement, mixed with fresh water, was used. The sand in both cases was a clear, sharp, granitic sand, obtained from the stamps refuse of the Balleswiddin tin mine, near Penzance, which is of excellent quality for such work, every grain being hard, angular, and rough.

It will give some idea of the fury of the sea at the spot to mention that, in the course of building, notwithstanding the extraordinary precautions above mentioned, thirty-four stones of the fifth course (which course it had been found impossible to complete by the end of the working season of 1865) were carried away by a heavy storm which raged on the 25th of November of that year. It is supposed that they were displaced by the mast of the *Star of England*, which was nearly wrecked in that tempest, and which cut off her mizen-mast to avoid being driven on the Wolf.

During 1861 Mr. Douglass had only one opportunity of landing on the Wolf Rock to determine the exact site of the lighthouse, and had then to be hauled back on to his vessel through the surf by a line fastened round his waist. The time of work which it was found possible to snatch from the sea was as follows:—

1862 ...	22	landings...	83	hours of	work.
1863 ...	39	,, ...	206¼	,,	,,
1864 ...	42	,, ...	267	,,	,,
1865 ...	41	,, ...	256	,,	,,
1866 ...	31	,, ...	224	,,	,,
1867 ...	40	,, ...	313¼	,,	,,
1868 ...	30	,, ...	276½	,,	,,
1869 ...	21	,, ...	194¼	,,	,,
Total ...	266		1,814$\frac{1}{12}$		

Allowing 33 working days, of 6·8 hours each, per annum.

The total cost of the Wolf Rock Lighthouse, including lantern, illuminating apparatus, and all incidental expenses, is returned by Mr. Douglass at 62,726*l.* This cost, considering the extraordinary difficulties of the work, compares favourably with that of any similar work which has yet been executed. It will be seen, if we compare the cost by the unit of the hour's work, with that of the erection of the beacon, to have been not very far different, coming to 34·5*l.* per hour. Distributed over the cube of the stonework, the entire cost of the lighthouse comes to but a fraction over 1·4*l.* per cubic foot.

With the triumph of the engineer over the fury of the Atlantic off the Lizard should be compared that attained in 1867–1873, at the cost of 76,000*l.*, in the erection of the Dhu Heartach Lighthouse, by David Allan Stevenson. As to further notice of this, however, of the gradual improvement of the catoptric apparatus, and of the advancing displacement of the concentric Argand burner now used by the electric light, we must look for another opportunity. The rumour of the extinction of the Eddystone Light will not prove altogether to be regretted if it calls the attention of the public to the noble work done by a branch of scientific men whose works are as durable and as brilliant as their writings are usually modest and instructive.

SANITARY SCIENCE.

A SKETCH BY MR. ROBERT RAWLINSON, C.B.

Sanitary science includes works and arrangements necessary to comfort and health,—the individual must be cared for. History, for the main part, however, records the deeds and misdeeds of emperors and kings, but the condition of the people is most fully recorded in descriptions of epidemics, pestilence, and famine, aggravated by negligence of sanitary science, as also by war.

The strength of a nation has hitherto been estimated by the numerical force of armies and their power to destroy; but sanitary science, when fully understood and reduced to practice, will reverse the order as above enumerated, and the history of the future will take most note of the condition of the people, and the strength of nations will be estimated by a standard of health and intelligence rather than by numbers of armed men compelled to live unproductive lives at the cost of civilians.

Sanitary works must be useful generally; and, to be so to the fullest, they must be simple in construction and in their arrangements. Supervision must also be ample, economical, and unceasing.

The prime works for aggregated populations will be main-sewering, house-draining, scavenging, and a safe and proper disposal of excretal and of scavenged refuse, with a full and pure water-supply, and with public lighting. Villages and isolated houses must be sewered, drained, and have a supply of pure water.

Arterial drainage, the conserving of rivers, and land-drainage come within the scope of sanitary science.

Road and street surface formations are most important works to facilitate general and local traffic, and must be provided.

Having stated these general requirements, it may be instructive to describe briefly some of the great sanitary works of former times; as, also, some of the existing sanitary works in Great Britain, on the Continent, and in other parts of the world.

Main Sewering and Draining.—Main sewers and drains were constructed in some of the cities of antiquity, and some public buildings were drained, but we have no evidences, written or in buried ruins, that can warrant conclusions that any city of antiquity was completely sewered, including house-draining. There is no evidence that land-draining, in detail, was ever practised by any nation of antiquity, as is now considered necessary by British agriculturists.

Water-supply. — There is abundant evidence, both in history and in ruins, that works of water-supply were executed. Springs of water were utilised, wells were dug, natural lakes were made available, and streams and rivers were led by artificial canals contouring the intervening country. Reservoirs, bunds, and tanks of vast area and capacity were constructed, from which water was drawn for domestic purposes, but chiefly for land irrigation.

There are ruins of aqueducts of great age, especially in India and in Italy,—the principal ruins in Italy being those near Rome. There is no reason to conclude that the laws of hydraulics were not understood in early times, as water placed under pressure would rise to its head. The metals lead, silver, and gold were used for pipes and valves, in baths, and in the formation of fountains, as also for jets; the use of iron upon a great scale for main conduits and service-pipes is undoubtedly modern. The Romans, however, used lead for main-pipe conduits, necessarily limited in diameter and capacity to suit the strength of the metal.

Pipes of earthenware, moulded on a block by hand, or raised on a potter's wheel, were also made and used at an early period for water-conduits to supply towns, baths, and fountains; in some cases earthenware pipes were bedded in hydraulic lime concrete, so as to enable them to resist pressure, and to be used for street mains, as also to be used as inverted syphons to cross valleys.

Rome, and some cities of Rome, were supplied with water in vast volume, distributed to public and private baths, as also to public and private fountains; but there is no written record, or other evidence, proving that a domestic supply of water by separate and special service was ever given to the masses of the people.* Main roads were formed by the Romans in Italy, as also in the great Roman provinces, streets were also paved in the great Roman cities, but we have no evidence that at any period highways, roads, and streets were general and were formed and paved as perfectly as those which at present exist throughout the several countries of Great Britain, France, parts of some other Continental nations, and in some North American towns.

Improvements in sanitary science are, for the most part, modern, and up to this date (1878) have had exceptional application. In British India roads, railways, and canals have been formed. Calcutta, and some other Indian cities, have been partially sewered, and works of water-supply have been executed for Calcutta, for Bombay, for Nagpore, and for some other Indian cities. In the Australian colonies works for water-supply have been executed, and main sewerage works are at this time under consideration. There has been considerable movement on the Continent of Europe in main sewering and in water-supply; as, also, in Great Britain; but in few towns have sanitary works been fully completed; probably not in any one are sanitary works, sanitary appliances, and supervision as complete as these might be and ought to be.

Complete sanitary works, appliances, and supervision should provide as under:—

For Towns. — The sewering and removal of subsoil-water so as to dry the basements of houses; main sewering of the town and draining of the houses, with a daily disposal of excretal and scavenged refuse, so that there shall not be any removable cause of nuisance. There must also be the formation of good roads in the city and in the suburbs, with the paving of all street and yard surfaces, in such manner, and with such material, as shall best prevent accumulation of dirt, diminish noise, and admit of cleansing by washing. Public lighting must be ample and general, as proper lighting is useful for police purposes.

The main sewers of a town should be of such dimensions, and be laid at such gradients, as will transmit sewage evenly and regularly at rates not in any case less than one mile per hour. The sewers should also be fully ventilated, and have at command ample flushing power. In all main and tributary sewers side-junctions for house-drains should be provided in the first construction, and all houses should be drained, but the drains should not traverse house basements. Water-closets and sinks should be against external walls, and should have means for lighting and ventilation from the open air. Cesspools and cesspits should be abolished. If a drain must traverse a basement from front to back, as in London and in other street houses, such drain must be absolutely air and water tight, and be fully ventilated externally, both front and back. Cast-iron pipes will be safest to use for such drains beneath basements. Back draining is, however, the true mode of sewering and draining streets of houses.

Water-Supply. — A town supply of water should provide for each house and each tenement, having a separate service-pipe and tap within the walls, the service to be high-pressure and constant; a volume equal to fifteen gallons per head of a population, with sound service-pipes and taps, efficiently supervised and maintained in repair, will be equal to the requirements of ordinary populations for all purposes, public and private.

Great mistakes have been made in the design

* The volume of water brought into London per day is about 110 millions of gallons. It is recorded that the twenty aqueducts which supplied Rome poured in 300 millions of gallons per day, or nearly the dry-weather flow of the river Thames over Teddington weir. Ancient authors are not, however, always to be relied upon.

and construction of sanitary works which it may be useful to indicate. As previously stated, the science is new, and some men who attempt to practise it have not learned the alphabet, not having had time, opportunity, or inclination. About 1850 three of the principal English engineers were required by the corporation of the city of London to advise and report upon the best forms and cross-sectional dimensions adapted for main sewering. In their report flat bottoms to sewers are recommended, as being the easiest to cleanse by hand labour, and, according to the rules laid down by these eminent men, no main sewer was to be constructed which was not of sufficient dimensions to allow men to enter. House-drains were not to be less in diameter than 12 in. This report was accepted by English and by European engineers generally, hence the tunnel and canal-like sewers of Paris and of Brussels, executed for small sections of these cities at vast cost in proportion to the areas sewered. Many of the first-formed sewers in London were large and flat-bottomed; scores of miles of such sewers remain to this day. The late John Roe and John Phillips first worked out the problem of egg-shaped sewers, with side-entrances and flushing chambers.

Since the year 1850, when I first introduced small sewers, laid at right lines from point to point, with side-entrances, manholes, or lamp-holes at each change of line or gradient, as also at junctions of sewers, many entire towns have been so sewered by thousands of miles of small sewers and drains, laid on the principles above indicated. The first town so sewered was Alnwick, in Northumberland, under the supervision of Hugh M'Kie, C.E., the present most able city engineer for Carlisle.

Defective sanitary works may be illustrated by Paris, which may be taken as an example of a city laid out above ground on a most magnificent scale. The main streets are in right lines, open and well paved; the houses are regular in their architecture, lofty, and being built of white stone, are clean-looking and imposing. Paris may therefore be termed the finest-looking city in Europe. Street scavenging and watering are also admirable; but there are many sanitary sores in Paris; as, notwithstanding its big and costly sewers, it is a city of cesspools which are emptied at intervals, carts, or iron tanks on wheels having been specially contrived for this purpose. The covers of these huge cesspools are to be seen at the surface in the newest and most architecturally imposing streets.

The supply of water to Paris is abundant in volume, and is used profusely for public purposes; as in grand cascades and fountains, road-watering, and street channel washing; but in quality the water is very hard, being to some people absolutely painful to wash in; the distribution within the house and tenement is not general. The true use of water is to supply, at high pressure, every house and tenement to the entire abolition of hand-carriage; and the true use of sewers is to remove all waste water and all human excreta at once, whilst unfermenting, to some outlet or outlets to be pumped and applied to land. At present there are the labour and cost of all the separate pumping from cesspools in detail, after putridity has set it, and the removal by horse-power of tanks and refuse which in the aggregate involves far more cost and power than dealing with the sewage if delivered at outlets by a full system of main sewers and house drains, as water flowing down a conduit finds the necessary power to do so in gravity.

London is an example of a vast city, sewered almost in its entirety, the houses being drained also into the sewers; cesspools and common privies having been abolished, though not all filled up, water-closets being the rule. Taking the entire population at some three and a half millions of inhabitants, there is one water-closet to about every five persons; or, there are about 700,000 water-closets in London, soil-pans which are used as water-closets being included.

The water-supply of London is also most abundant, and is far softer and consequently purer than the water supplied to Paris. It is true that in London there are no vast cascades or grand fountains, neither are the streets so well watered and washed, nor the street channels so fully flushed and washed, as in Paris; but the city at large is vastly better sewered, has water at high pressure, which is taken within and to the top of the best class houses, and is delivered within the tenement, or near the door of the poorest inhabitant. There are no large recognised cesspools in use, cesspool refuse carts, nor water-carriers. There are, however, defects both in sewering, in house-draining, and in water-supply in London, the result of defective information and divided jurisdictions. Parish vestrydom is not an apt learner: the local governing system is old, the form of election is old, and the ideas and prejudices are old. London has not been improved, laid out, and reconstructed under Imperial authority, but has grown up under Dogberry blundering and speculative building, house-draining being the builders' work, the parish authorities having, and very improperly, only extracted a fee for each drain entering a sewer without taking the responsibility of seeing that each house-drain did properly join and enter the sewer as paid for, the results being no junctions in some cases, bad junctions in many cases, and no house-drain ventilation in most cases. The street-sewers are ventilated, but not house-drains as a rule. There are many miles of old flat-bottomed, broken-sided, shallow, and defective sewers in some of the richest London parishes, sewers which accumulate refuse and require to be hand-cleansed; but there are also very many miles of well-formed sound sewers, which, by the ordinary flow or by flushing, transmit sewage through the new intercepting and low level sewers to be poured wholesale in the crude state into the Thames at Barking and Crossness, the solids so scoured along, and in suspension, amounting to many thousands of tons per annum. Taking the ascertained results of some towns where the solids of sewage are intercepted, the volume and weight of silt and sludge annually washed into the Thames must amount to 200,000 tons or more.

Modern sanitary works have in some respects disappointed expectation, as reductions in local death-rates do not appear to have followed closely upon the expenditure of money and the execution of works; but it is probably overlooked that sanitary works of the most perfect design and execution, with the best regulations fully carried out, do not in themselves solve all the problems of human health. There are the wretched houses, hovels, and tenements of the poor in every town and village of Great Britain, so frequently described by the editor of the *Builder*, in which excessive overcrowding takes place, and out of which inevitably proceed pauperism, crime, and disease. Sanitary science does very little to improve these dens of foul air and misery, unless it entirely supersedes them by new and better dwellings, and the old cottages are improved off the face of the earth, and this is both a costly and a slow progress; then there are spirit and beer drinking, tobacco smoking and chewing, with defective feeding and want of proper clothing amongst the poor, and want of sense to clothe properly amongst the rich, to make up the sum of human neglect and human misery. When these things have been studied, learned, and considered, wonder at continued excess of disease will diminish.

As the strength of a nation is in the health of the people, it must be the duty of Governments to see that means of health are secured to every child born into the world. There is no value apart from human life, and there is no form of property so valuable as human life, and as the poor cannot provide their own dwelling-places, and as experience from the first dawn of history proves that defective tenements produce disease in excess, it must be a prime duty of a Government so to legislate, order, and regulate that health shall be possible within the cottage.

The inhabitants of a city cannot, however, all be treated as are criminals in jails; consequently the health attainable in a model prison is at present exceptional; but sanitary works, properly supervised, can prevent raging epidemics by removing the soil in which the disease, seed, or germ, fructifies. Typhus fever, cholera, and other zymotic diseases may decimate a filthy, drunken, demoralised population, and yet never enter the county model prison. The black-death, plague, and sweating-sickness of Mediæval Europe appear no more in England, but haunt the foul cities of Asia, and yellow fever now rages in the foul southern cities of America, teaching a lesson terrible to study, but instructive to learn.

Photographic Society of Great Britain. The annual exhibition of this Society opened on the 9th inst. in the gallery of the Society of Painters in Water-Colours, Pall-mall East.

RETROSPECTIVE ARCHITECTURAL STUDY.

Our object under this heading is not to suggest any new analysis of architectural history, or to inspire any fresh enthusiasm in regard to the study of the relics of the past. The inclination for this part of architectural study exists strongly and widely enough, and no wonder, for few studies can be more fascinating than that of structures in which picturesque effect, historical significance, and the poetic interest of antiquity, are all combined. Wherever civilisation has cleared a tolerably easy way for the traveller, and even in places where it has not, architectural remains have been sketched and measured, and written about, often in a manner involving going over the same ground many times by different illustrators. Our object is to suggest whether this view of architectural study has not too large a place with us, and whether it is not even exercising in certain ways a hurtful effect upon the modern practice of the art. In fact, our heading should, perhaps, have been "Prospective Architectural Study," but that might have looked too daringly prophetic; besides that, it would have been taking the name of something which does not exist; the non-existence of which is our subject of complaint, in fact.

Of course, both in art and science, the basis of study must be, in the first place, the knowledge of what has already been done, without which it is impossible either to know what is wanted or to be in a position to supply it. But it must be apparent to those who compare the progress of art and science in the present day, that science invariably looks ahead, and makes past accomplishment the basis for further development; while we are compelled to confess that a great deal of modern artistic practice is confined to the effort to equal what has been done before, to do it again in the same way, and to be very well satisfied if the modern reproduction is in any degree worthy to be compared with the original production. The latter is assumed to be worthy of imitation almost on the mere fact of being old. The modern artistic creed, especially as to architecture and decoration, would make the optimist philosophy retrospective,—"whatever *was*, is right."

With the relation of the question to the purely artistic arts, sculpture and painting, we are not just here concerned, except as regards one word of comparison. Art, of course, is not, like science, progressive or nothing: we have no ground to demand that our modern painter should carry us further than Titian, in the same way that we demand that our modern physiologist should take us further than Cuvier, and that our modern engineer should surpass his predecessors. But modern painters, at all events, have recognised that it is of no use to be Titian over again, even if they could; that the modern world has its own feelings and sympathies, and desires to have them reflected in modern art. The interest of the modern school of painting may be (we do not say it is) inferior, its aims may be less lofty; but it is *sui generis*, it makes a chapter of its own in the history of painting. It is a singular contrast that a pursuit like that of architecture, which is much more blended both with science and with practical life than is the art of painting, is at present not only carried on, but deliberately studied, in a way more decidedly retrospective than is the case with any of those which are more purely fine arts, *i.e.* more independent of practical considerations and necessities.

The "carrying on" the practice of architecture in retrospective styles, is, of course, an old story, a complaint against contemporary architecture which is almost worn out. But considering the amount of complaining which there has been on this head, and the frequent candid admission, on the part of architects, that it was not the right thing, that it was what had never been done before in architecture, and that it does not even give themselves satisfaction,—considering all this, it seems curious that the studies most inculcated upon the rising architectural student are precisely those which tend to foster this reproduction of old architecture, and that this kind of study is the most popular with students, both with those who are technically *in statu pupillari*, and those of older standing. Apart from remunerative professional work, the possession of which may be assumed to constitute the highest and purest enjoyment which the professional architectural mind can receive,

there is nothing so fascinating to the architect as sketching ancient buildings, and, on the whole, nothing for which he gets so much credit.

The fascination is perfectly reasonable and comprehensible. It may be going a little too far to say, as an eminent architect has said in one of his publications, that no pleasure in life *can* be so great as that enjoyed by a sketching architect on a tour through old towns. A landscape-painter in a fine country would probably have something to say on his side; and we have heard a naturalist declare that no pursuit could afford a pleasure equal to the discovery of a new species of moth. But anyhow, there is no doubt that the combination of change of scene and air, picturesque and historic interest, and the exercise of a delightful occupation, justify the architectural sketcher in lauding his way of holiday-making pretty highly. What is not quite so clear is, why those who are learning their profession should be encouraged to give so prominent a place to this occupation, and should receive for its successful practice almost their highest rewards; and that their senior brethren in the profession, when they have time for a tour, should be content to devote themselves in general so exclusively to the monuments of the past and almost ignore the doings of the present.

Take the case of the Institute prizes to students. The most coveted of these is the Pugin Travelling Studentship, and the use made of it is always to bring back a portfolio full of sketches and measured drawings of old buildings not at present illustrated, which has a practical value, as it encourages the production of accurate records of structures as they at present exist. But these two are always the prizes most competed for, and what is practical in regard to modern architecture finds little of either encouragement or response. Now, when there is this encouragement given to running over Europe and sketching old buildings, with no corresponding impetus given to the study of modern buildings, their successes and their failures, it can hardly occasion any surprise that our modern architecture consists so much of buildings which look as if they were put together out of a sketch-book. Those who produce them have almost been brought up to think that to do this,—to make buildings in this way,—is the highest object of their profession.

In Scriptural phrase, we may say "these ought ye to have done, and not to leave the other undone." The cultivation of an instinctive feeling for what is noble and durable in architectural style cannot perhaps be so well attained in any way as by sketching the finest remains of architecture that are left to us; but the relation of this practice to the real requirements of modern architecture should be kept in mind. Sketching should take its right place; important, but not the principal and central object. It has become almost a commonplace of architectural criticism to say that a true style is founded on utility; yet we give the best honours to our students for a line of study which tends all the other way; which fosters a certain sentimental taste in regard to design, to which the practical requirements of the profession have to bend, instead of the reverse process, which is the right one. The English system of apprenticeship in an office is supposed, no doubt, to give an insight into the practical side of the profession; but then the probability is that the principal, whose work goes on before the pupil's observation, is himself practising a sentimental style; and in fact, this is most particularly the case in those offices into which clever and enthusiastic students specially endeavour to obtain admission. The error is thus propagated from one architectural generation to another, and everything which most impresses a student in the course of his studentship goes to confirm and strengthen it.

Now if, instead of giving undue prominence to prizes for sketching ancient buildings, a leading prize or travelling studentship, the best and most honourable, were offered to the student who should bring home the best and fullest notes of modern buildings and works in progress in different countries, the best illustrative sketches (where there was opportunity of obtaining them) of constructive detail and design, and the best critical suggestions for improvement in either respect where defective,—we venture to submit that a substantial annual prize offered with this object would do more to promote the advancement of architectural students in what is really the most important aspect of their profession than any of the prizes now usually offered and contended for. What the public look to from the architectural profession is, in the first instance, to provide buildings thoroughly healthy and thoroughly suitable for their intended purpose, and embodying the best scientific construction and arrangement which the resources of the day render possible. Questions of architectural style are really only secondary in public opinion; and though it is certain that part of the general indifference on this score is the result of ignorance and want of cultivation, and that it is much to be deplored, still in the main it must be admitted that the common sense of public opinion, in refusing to be put off with pretty and archaic structures which do not properly answer their practical purpose, is in the right in regard to putting the most important requirement first. Yet we really seem to take no decided step towards systematically encouraging the study of architecture on its practical side.

This subject is the more important, because upon the neglect of it depends, we thoroughly believe, much of the failure and want of genuine interest in modern architecture even on its purely artistic side. If the practical wants of the day were made more primary objects of study and investigation, we should see a more original and genuine style of architecture spring out of the endeavour to realise and express these wants: we should no more see baths built like town-halls, and law courts with frowning and barbaric-looking towers for keeping in awe a populace who are really the most law-abiding and peacefully-disposed people of Europe.

In the art of painting, as the study of it is now conducted, whatever admiration for the art of another time may possess the student, there is always interposed, between him and the school he might be disposed merely to imitate, the direct influence of the study of nature in the life-school. However he may be inclined to fall into the mannerism of this or that artist or period, he is not left to do so without the continual forcing upon his attention of Nature herself, and in his very conventionalisms and reproductions he is obliged to accept her genuine forms as the basis of his design. It is this kind of influence which we feel the want of in regard to architecture, although in a broad sense we may say that it is always before us if we will make use of it. The architect's life-school is the life of the society of his day; its demands, its habits, its inventions, its improvements. It is his part to take these up where they are, to judge where they are sufficient and where they want improvement; to bring all his observation, experience, and acquired knowledge, to perfecting them; and then to put them into as picturesque a dress as may be. In thinking of and studying the picturesque first, and the practical afterwards, he is putting himself out of accordance with the contemporary public; offering them what they (perhaps erroneously) do not much care for, and neglecting that for which they mainly look to him. It cannot be surprising if, under these circumstances, he has not only less real claim on the appreciation of society than he might have, but that he receives even less than he is entitled to; and that when he puts foremost that which should be secondary, public judgment is inclined to take away from him even that which he seems to have.

We beg to return again to the conclusion already indicated, that there should be some change in the relative importance given to practical and to archæological study on the part of those who specially concern themselves with architectural education, and on the part of the central body of architects in particular. We should like to see a travelling studentship established by the Royal Institute of British Architects, the object of which should be to encourage and promote the study of architecture in its most modern practical and artistic development in civilised countries generally, leaving the study of the picturesque element in ancient remains as a fascinating, and, if the reader will, a necessary element of the student's education, but still a secondary element. An aspirant for honours in such a studentship should be expected to take account of materials employed in various neighbourhoods, and their suitability, cost, and apparent durability; of new ideas in construction, ventilation, and drainage, and everything else which pertains to the well-being of man, considered as a creature living in houses. He should not by any means neglect, but rather give the most detailed attention to, engineering structures (which are only an important part of architecture unfortunately divorced from their natural place in its curriculum); and if he thinks them, as he no doubt will, less beautiful than old cathedrals, let him exercise his invention in showing how they may suitably be made more beautiful. He should form acquaintance with the building materials which are the special resources of each country, and consider which among them offer the best conditions for future use consistently with appearance, economy, and permanency, and what form of architectural or artistic treatment seems best suited to them. All this would not necessarily supersede the study and delineation of ancient buildings; but it would take precedence of that study, as embodying the first and most essential considerations which are the basis of all real architecture, and giving to them their right place. It might be some time before the habit of regarding architecture from the merely sentimental point of view was broken down; but an educational move of the kind we have been suggesting would do something to inaugurate a change, or at the least to suggest that a change was desirable, and that the modern architect, if he is to be the power in the world that he might be, must look before him and not behind him in his studies.

THE CLEANSING OF THE THAMES.

It is with the utmost satisfaction that we remark that the *Builder* is no longer unsupported in its efforts to promote the decent purity of the Thames. The evidence that has come to light as to the condition of the river at the site of the loss of the *Princess Alice* has brought conviction to all persons who have had opportunity to express their opinions on the subject, with the exception of the majority of the Metropolitan Board of Works. They, as yet, stand firm, but they do so like men who remain on a rock around which the tide is steadily rising. There are abundant signs that the public will not put up with the jaunty and contemptuous indifference displayed in what was offered by the Board as a reply to the first report of Capt. Calver. The City of London itself has spoken. The Town Clerk has called the attention of the Metropolitan Board of Works to the report of the medical officer of the Port of London Sanitary Committee on the foul state of the Thames near Beckton. The Woolwich Local Board of Health, on the 8th instant, ordered an analysis of the water to be made. In the report of the meeting we rejoice to see the fruits of that study of the law of the case which we have been so anxious to recommend. Ten days or a fortnight ago the positive assurances of the officers and advocates of the Board of Works, that they were acting within the rights conferred on them by the Acts of Parliament, were accepted as unfortunate, but undeniable. Now there are signs that the assertion is becoming valued at what it is worth. Capt. Behenna, R.A., at the meeting of the Woolwich Board of Health, spoke of the outfall which the Metropolitan Board had constructed and maintained, "in defiance of their own Act of Parliament." This is the true keynote. Nor are the Conservators of the Thames supine. Their secretary, Capt. Burstal, has officially addressed the Metropolitan Board, under date of October 9th, enclosing Capt. Calver's rejoinder to the joint report adopted by the Metropolitan Board, together with remarks by the secretary, and by the engineer of the Conservators, on the same document. We have received, too late for full noticed this week, copies of these papers. The Conservators maintain the position taken up by them in their letter of the 6th of December, 1877, to the Metropolitan Board of Works, and point out that if the Metropolitan Board still maintain their non-liability to dredge away the deposits complained of, or if they agree with Sir J. Bazalgette as to the origin of these deposits, "it would then become evident that a difference of opinion, such as that contemplated by section 20 of the Conservancy Act of 1870, has arisen between the two Boards." The Conservators express their "trust that the Metropolitan Board of Works will modify their views on this important question, and not only cause the existing deposits to be dredged away, but also adopt such measures as will prevent the formation of any deposits for the future." This is a mild and dignified remonstrance. It is, however, rather the Master of the Rolls than the Chairman of the Metropolitan Board of Works that we regard as the person

whom the Conservators of the Thames should address in order to produce any effect. The Board has resolved that a letter be written to Capt. Burstal asking for a plan showing the position and configuration of the shoals and obstructions in question. If the health of London and the purity of the Thames are to be made the stakes of a clever game of diplomatic chess, this is a good move on the part of the Metropolitan Board. We hope that the Conservators of the Thames will not fall into the trap so adroitly laid. The fact is, and it is well known into the bargain, that banks and shoals in the Thames, as in the Seine, and in most tidal rivers, are constantly shifting. Large banks accumulate in the ebbs, in the latter river, which disappear as the tides strengthen. We know too little of the Thames to predicate the exact manner in which the channel varies between spring and ebb. It would be of great value to London to have a continuous survey of the river made, extending over at least a year, in order to give some idea of the changes which are effected with varying winds, tides, and floods. But we do know that sewage makes its way some fourteen miles and more above Barking Creek in certain states of the tide. We also know that the river is steadily gaining, both in depth and in range of tide. It is thus very probable that any particular deposit, such as,—unexpectedly to every one almost,—so rapidly formed around the wreck of the *Princess Alice*, would hardly be formed, discovered, and surveyed, before it might be wafted away into some other part of the river. Thus any particular deposit pointed out by the Thames Conservators on the invitation of the Board, might be carried to some other locality by the time it was next sought for. And thus, without any accusation of bearing false witness,—or even of looking too persistently through a glass bent in a certain direction,—nothing is more likely than that any bank specified by Capt. Burstal might be found to have departed by Sir J. Bazalgette.

It is not on the dimensions of this bank or that mud-heap that the case can be allowed to turn. We hope that this firm and sensible ground will be taken by the Conservators of the Thames. It is on the unquestionable fact that the sewage of London is turned raw into the Thames that the gravamen of the case depends. This fact is contrary to the laws of public health, public safety, and public feeling. It is, in our opinion, and as stated by Capt. Behenna at Woolwich, contrary to the provisions of the Metropolitan Acts of Parliament. Here the Conservators of the Thames have firm ground, from which we trust that they will allow themselves to be neither cajoled nor driven. Here the Port of London Sanitary Committee, the Corporation, the Woolwich Board of Health, and even the minority of the Metropolitan Board of Works, will support them. Nor can we doubt for a moment what will be the verdict of public opinion, now for the first time having been thoroughly enlightened as to the real facts of the case. We doubt whether the Conservators of the Thames are aware of their own power, either to obtain immediate redress from the tribunals, or to secure the hearty support of the metropolis.

THE SOCIAL SCIENCE CONGRESS.

The annual Congress of the Social Science Association will meet at Cheltenham on the 23rd, and though there may, perhaps, hardly be expected to be the local interest in some of the topics of discussion which would be found in towns existing under different social conditions, there is certainly no lack of matter for interest in regard to the subjects to be considered, and it will be not without significance to observe the attitude with which they are regarded in the neighbourhood. In most cases the Congress has been held in towns which were full of active and busy life; and though there may be as much life in Cheltenham of another kind, it is essentially rather a place of quiet and retirement than of active business life, and the problems of social life must certainly, under such circumstances, present themselves under a different light from that in which they appear in places where the full tide of trade or manufacture is keeping every one practically on the *qui vive*. There may be less interest taken in some subjects than would be the case at other places; on the other hand, we may perhaps look for some suggestions from Cheltenham in regard to sides of social questions which would be less considered elsewhere.

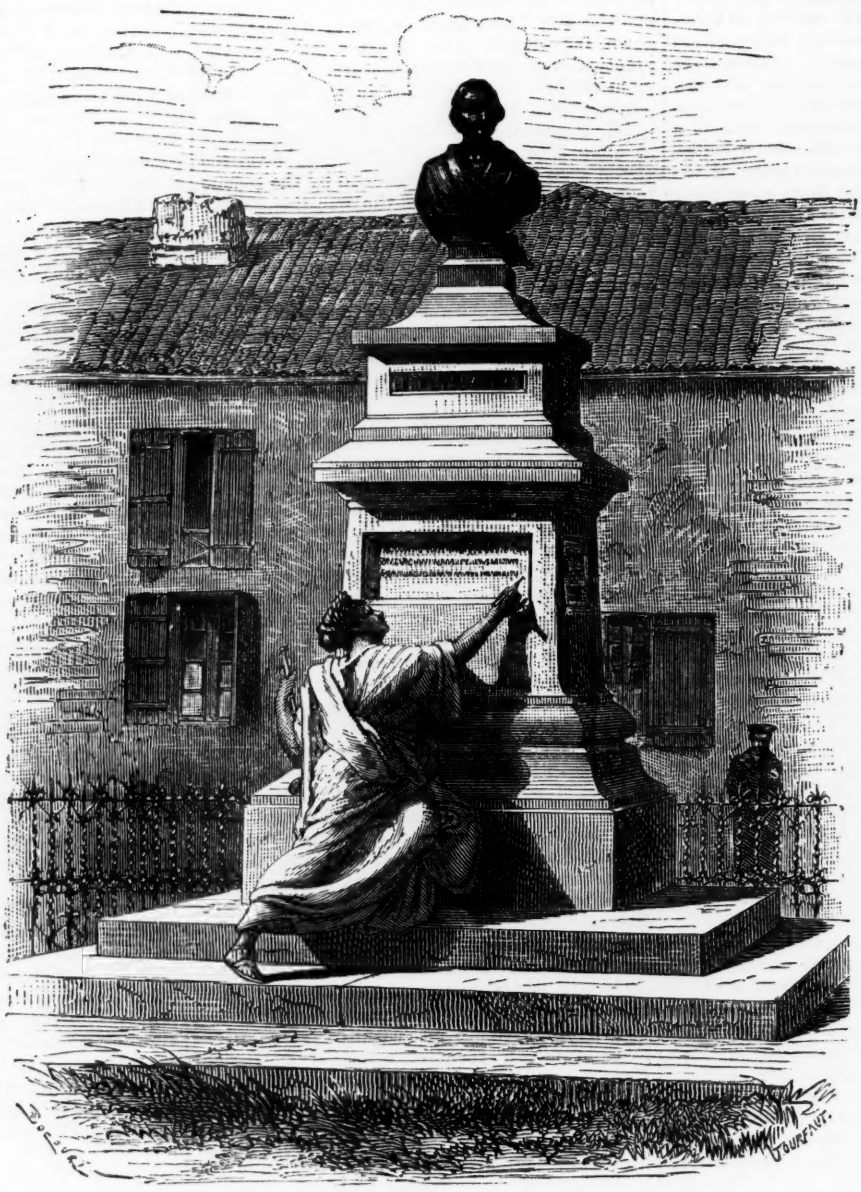
In the two departments which are of special interest to our readers, the Health Department and the Art Department, there is a great deal down for discussion in direct relation to the practical working of architecture. The second main subject for discussion in the Health Department, on the better regulation of house-building generally, covers a field large enough, at all events, and would be perhaps even too vague were it not a little defined by the second half of the statement of the question, which gives it a turn in the direction of "the sanitary condition of existing houses." The object of this definition is, we believe, to induce the consideration of the best means of securing sanitary improvement at once, and of accordingly enforcing changes in existing houses, instead of waiting till all the habitable but unsanitary houses can be pulled down and replaced with better ones on improved principles. It is to be hoped something will come of this. While house-owners are waiting for the expiration of the life, so to speak, of their houses, ready to improve their sanitary conditions as soon as it becomes absolutely necessary to pull down and rebuild them, but not before, these unsanitary houses are not standing idle, but are busy in the work of death, and whilst their lives are lengthened, are shortening the lives of those who (endeavour to) live in them. If the outer shell of a house is so good that it cannot pay to pull it down, or be fair to the owner to compel this, let at least the interior arrangements be brought under compulsory improvement, that such dwellings be no longer whited sepulchres, more or less beautiful outward, but within full, if not of dead men's bones, at least of much uncleanness, calculated to lead to that kind of anatomical preparation.

How to prevent the evils of overcrowding, the third leading subject in the Health Section, seems practically limited to two alternatives,—either to have more house-room or fewer people. However, perhaps some one may strike out a new and unexpected light on the subject. In turning to the Art Section, we find again the subject of house or street architecture cropping up, in the question, "How can Street Architecture be best improved with due Regard to Economy?"—a form of question which obviously touches on the problem of bringing architectural embellishment to the poorer quarters of towns: a matter which the architectural mind of the day has hitherto neglected, or not had opportunity to solve, and which is one, perhaps, of the few things which it is left to architecture to attack as a comparatively new problem. The question is to be opened by a paper from Mr. H. H. Statham, who has already given some special consideration to the subject in its connexion with the objects of the Social Science Association. The other two leading questions in the Department are the promotion of a sound knowledge of music, and the best means of bringing good examples of art within the reach of the populations of small towns and villages. In regard to the former question, it is of some interest to observe that this is the first time that music has been introduced as a subject of consideration in the Art Section; or, as far as we remember, in the proceedings of the Association at all. Some difference of opinion existed, we believe, as to the fitness of the subject for discussion under the head of "Art," certain of those concerned holding the view that the term "art" was only rightly applied to that which was concerned with reproducing in some way or other the forms of nature. To show how and why the term and the idea generally implied in it are equally applicable to the process of musical composition, would perhaps take us over the line a little; but, apart from that, the criticism may be sufficiently answered by the consideration that what the Art Section is really concerned with is the development of the beautiful side of life, and that the word "art" itself is used not so much as defining quite literally the boundaries of the section, but as the most comprehensive and generally intelligible expression that we have to represent the class of subjects of which it is desired to treat. The fact that the paper on this question will be read by Mr. John Hullah, who has had more to do with musical education in this country than perhaps any other single person, is a guarantee that the subject will be handled in a thoroughly able and practical manner. The consideration of the possibility of bringing good examples of art within the reach of the dwellers in country districts (the third leading subject in the Art Section), is one in which we naturally feel much interest, since the *Builder* has for so many years dwelt upon the importance of bringing people to familiarity with the sight of first-class works of art, as one of the first and most certain steps towards making them care for it. The subject will be dealt with by Mr. T. C. Horsfall, a gentleman who has exerted himself very much in the cause of popularising art in Manchester, and is the author of an address or pamphlet on the subject marked by admirable critical perception as well as genuine enthusiasm; and we may hope that his paper and the discussion of the subject will give some impetus to a movement which is very much to be desired.

We are in a position to mention what will probably be the subsidiary subjects treated of in the Art Section, some of which are perhaps of equal interest with the leading papers. The arrangement of the sequence of papers has been made so as, as far as possible, to keep the subjects in groups which have an affinity with one another. Thus, the paper on street architecture it is intended should be followed on the same day by one on some neglected principles of decoration, by Mr. Skipwith, of Cheltenham. That on musical education will be followed by one on the subject of the improvement of dramatic art in this country, partly by the establishment of a national theatre in this country as in France; a communication on the subject will be read by the conductor of this journal, who, as a good many of its readers are aware, has long felt a special interest in the subject, and who will be able to bring forward very valuable and interesting letters in regard to it from two of the most eminent actors of the day. Professor Armstrong follows with a paper on the same question. The paper on question 3 will be appropriately followed by one from Colonel Blair, of Cheltenham, embodying, we believe, something like a practical application of the subject to Cheltenham. An important contribution is promised by Mr. P. H. Rathbone, of Liverpool, who was, in fact, the founder of the Art Section, and who intends to bring forward the subject of the use of the undraped figure in modern art, mainly with the view of correcting misunderstandings and misapprehensions in regard to it, which, as every one knows, are prevalent enough among the English pnblic of all classes,—at any rate, out of London. The question is, in fact, mainly one of more or less education in regard to the aims and the technique of the art of painting. Mr. Rathbone, as being largely concerned in the arrangement of the Liverpool picture exhibitions, has already been in hot water with the "Philistines" of that town about a picture of Mr. Tadema's, as we mentioned in a previous number, and does not seem inclined to sit down quietly under their teaching. His effort is a laudable one, and may do good, though we fear he will hardly find a very largely sympathetic audience. Other papers will be contributed by Dr. Phené, by Mr. Hamilton M'Carthy (on Sculpture), and by Mr. Watherston on Jewelry Art.

It is gratifying thus to see that the idea of an Art Section does not seem to be found unpractical, or to be likely to fall to the ground, and, in fact, the number and variety of the papers promised this year are considerably in advance of those of last year at Aberdeen in the same section. The local committee seems to have made every effort for the convenience of the visitors, judging from their circular giving information as to the ways and means of Cheltenham; and we think everything promises a week both of pleasure and profit.

The Liverpool Landing Stage. — The dispute between the Gas Company and the Dock Board, as to the amount to be paid by the former towards the cost of the reconstruction of the Landing-stage, has been amicably settled, and arbitration, which was to have commenced on Monday last, is dispensed with. The Gas Company had made an offer to pay 17,500*l.*, in addition to the amount they had already paid (70,000*l.*), and this offer was considered on Monday at a special meeting of the Dock Board, when it was resolved to accept it by eleven votes to eight. The arbitration, the *Daily Post* understands, was to have gone on the basis of a claim made by the Dock Board for a total payment of 130,000*l.*, or 60,000*l.* more than the Gas Company contended they were entitled to pay under the agreement come to when the case was before the court, when the verdict was given for the Dock Board.



THE BASTIAT MONUMENT, MUGRON, FRANCE.

THE BASTIAT MONUMENT, MUGRON, FRANCE.

We illustrate a monument which has been erected to the memory of Frédéric Bastiat, the well-known French Free-trader, in the little town of Mugron, Département des Landes.

The town of Mugron, which has thus honoured an eminent economist, was not his birth-place. Frédéric Bastiat was born at Bayonne, on June 29th, 1801, where he continued to live until he was nine years of age. Having the misfortune of losing both father and mother, he was received into the house of his maternal grandfather, who was the owner of some property in the town of Mugron. In 1825, through the death of his grandfather, he came into the possession of about 200 hectares of land, and it was on this estate that he continued to live nearly the whole of his life. In 1831 he was made Juge de Paix of his canton; in 1832, Conseiller Général; and in 1848, his co-citizens sent him to represent them in the Corps Législatif. He sat for some time, but his health failing, he proceeded to Italy in hopes of improving it, and died at Rome, December 24th, 1850.

It would take too long to pass in review the numerous works of Frédéric Bastiat. Placed in the counting-house of an uncle at Bayonne, he applied himself sedulously to the study of the principles of trade; and having to visit Spain and Portugal on business in 1840, he availed himself of the opportunity of studying the commercial regulations of the two countries. He was throughout his life an advocate of Free-trade, and he gave early expression to his views on this important subject. In 1834, he published his "Reflexions sur les Pétitions de Bordeaux, le Hâvre, et Lyon"; in 1841, "Le Fisc et le Vigne"; in 1843, "Mémoire sur la Question vinicole"; in 1844, "Mémoire sur la Répartition de l'Impôt foncier dans le Département des Landes." In the same year appeared in the *Journal des Économistes* the article "De l'Influence des Tarifs anglais et français sur l'Avenir des deux Peuples," in which he first openly avowed himself the adversary of the principle of protection to trade,—a principle at that time universally acted upon in France, and almost universally recognised as just and expedient. This latter work established Bastiat's reputation. He soon gained adherents, and time and truth, with the example of England, carried his principles forward, till they were acknowledged and finally adopted and extended by the Government of France. In 1845, after a visit to England, where he had made the acquaintance of Mr. Cobden, he translated, under the following title, many of the addresses of the Free-traders, prefacing them by an introduction: "Cobden and the League; or, the English Agitation for the Freedom of Exchange." In this he adduced all the inconveniences of a prohibitive system. He became secretary of a society in Paris for promoting the freedom of trade, and editor of a journal devoted to the same cause.

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* **Biarritz.**—The new Anglican Church of St. Andrew, Biarritz, was consecrated on the 12th inst. by the Bishop of London.

IN PARIS THIS WEEK.

A stroll through the Workmen's Exhibition, near the Port Rapp, just outside the Great Exhibition itself, is interesting; but, as remarked in your leader of the 5th inst., is also a trifle disappointing. Our own Working Men's Exhibitions, at the Agricultural Hall, Islington, and at various places in the provinces, altogether eclipse this display made by their brethren across the water. A number of good things are certainly shown, but, as a rule, they are not quite up to the standard that, under the circumstances, one would expect to find brought together. Happening to have the copy of the *Builder* in question in my pocket, I begged its acceptance upon the manager, and have pleasure in testifying to the great gratification shown by him and a number of French workmen at finding their efforts noticed so kindly by this publication.

Delightful is a stroll through the picture galleries of the Exhibition, but still more pleasant and instructive is a saunter amongst the architectural galleries of Europe. The difference in style in getting up elevations and perspectives,—ay, and plans, too,—by the architects of various nations is very pronounced. In this I feel anything but sure that our own profession stands out very prominently. There is no building I know in Europe so magnificent, in my mind, as the tower façade of the new Manchester Town-hall; yet the large drawing Mr. Waterhouse shows of it, rather than intensifying its nobility, looks brown and smudgy; whilst pen-and-ink sketches, such as Messrs. Ernest

George and Peto's Rousdon, or Mr. Herbert Carpenter's interior of Lancing College Chapel even, look flat and cold, and unattractive, as compared with the productions of many foreign architects. I have often wondered why the architectural court at the Royal Academy is always so empty, even when a "crush" is on in the adjacent rooms, whilst the compartments of an architectural exhibition I visited some time ago at Amsterdam were thronged all the time I was there with an admiring crowd of Dutchmen. The educated classes in England, certainly, have sympathy with architecture,—the large sums spent thereon annually prove that,—but somehow the drawings do not appeal attractively to the eye. I suppose the difference between an architectural drawing and a pretty painting is just that which exists between a tall, noble, finely-chiselled, self-contained, and well-read woman, and a dimple-chinned, bright-eyed, and laughing girl, with nothing in her, but attracting everybody to her as surely as her companion, whilst commanding respect may be, repels. Another architectural treat is to be seen at the Trocadéro, where at the two ends of one of the main corridors may be found an exhaustive series of 352 photographs, 16 in. by 11 in., giving illustrations of as many restorations of churches and historical buildings. Some are internal and some external views; there are buildings complete, and others with scaffolding up and in course of renovation; but each is alike interesting and instructive. All round the circular corridor running within the open arcading on the exterior of the garden side of the Trocadéro, is an immense collection of drawings, showing what France can do in architecture,—religious, military, civil, and domestic. The drawings relative to the former predominate, and the whole are stretched in frames, averaging 4 ft. by 3 ft. 6 in. To my mind they go far to prove that the French architect stands very high amongst his compeers of the world.

The places of convenience are not too numerous by half in the Exhibition grounds, and are conspicuous by their entire absence within the building itself. The uniform charge of 2½d. for the use of one is also undoubtedly excessive, and falls heavily upon those whose duties keep them continually in the Exposition.

I could tell a curious story as to the abstraction of circulars,—how they are appropriated to purposes never contemplated by the exhibitors to whose goods they refer.

Great uncertainty seems to exist, even amongst the best informed officials, as to when the Exhibition will be closed, but it is pretty tolerably sure that it will not be kept open more than a fortnight after the time first stated, *i.e.*, the end of the month.

The original cartoon for the Diploma of Award is exhibited in the main pavilion, and is pleasing. It is 3 ft. 6 in. by 3 ft., but the engraving therefrom which will be given to successful exhibitors runs smaller, being (the engraved part) 1 ft. 8 in. by 1 ft. 5 in. It is somewhat similar to others of its class, but infinitely more artistic than is the Philadelphian one. On the top is a good figure of France sitting with her left arm thrown familiarly over the shoulder of Peace, who carries in her hand a spray of olives. France has unbuckled her sword from her waist, and lays it carelessly but handily upon her knees. With her right hand she grasps cordially the extended palm of Industry, in the garb of a workman, who is presented to her by a Cupid with a torch. In Industry's left hand are a hammer, pincers, &c. The supporting pilasters on each side are decorated on their panels with olive trees, and ribbons bearing upon them names dedicated to Industry and the Fine Arts. At the foot of the pilasters lean nude youths,—not too well drawn perhaps,—the one carrying a palm, whilst he looks up to France, the other holding a plan of the Exhibition and a Mercury's wand. At the base, is massed a group of agricultural implements and foliage, whilst as a centre thereto upon a plain panel resting in a triangle occurs the monogram RF (Republic of France). The subject is described in French:—"*La France appuyée sur la Paix protège le Travail.*" The design is from the pencil of Paul Baudry.

Perhaps the most beautiful bit of woodwork in the whole Exhibition is to be found in the French court, and is shown by Guéret Frères, 216, Rue Lafayette, Paris. It is a cabinet and secretaire in boxwood; and for design, general good workmanship, and for exquisite delicacy and carving, is simply superb. Messrs. A. Beurdeley Fils, of 24, Rue Dantoncourt, also exhibit wonderfully fine work in the same material. A small side-table contains a wealth of the most marvellously carved detail,—too fine, perhaps, for utility, but so lovely withal that I found myself upon my knees before it in unconscious admiration ere I realised my position. A very large panel by the same firm, in lime-tree, is also a beautiful specimen of carving. Messrs. Jackson & Graham, who have carried off the grand prize, show a glorious ebony and ivory cabinet, as well as several other inlaid ones, so perfectly made that the attendant facetiously offers a large magnifying glass, and defies, even with that artificial means, the discovery of a joint or a flaw in the inlaid woods. Every visitor to Paris has probably been in the Prince of Wales's Pavilion, and breathed the atmosphere of art that pervades that building. The walnut-skirted dining-room; the Adams furniture in the boudoir, with all the exquisite little boxwood figures upon ebony panels,—delicate as the finest of cameos,—the Japanese-room, and, indeed, everything that Mr. Collmann, the courteous attendant in charge, points out, are all as excellent as they can be. The furniture in Messrs. Collinson & Lock's house is all good, and although immensely less ambitious than that of Messrs. Gillow, is pleasing; especially so the oak panelling in the lower rooms, and the quiet pale-green grey Jacobean wood mantelpiece upstairs. In walnut wood there are few things to equal, and nothing to beat, the work shown by L. Frullini, of Florence. His walnut cabinet exhibits great power in the way of carving,—his foliage and birds being most artistic. Equally good are two long panels shown by him, and which, I am glad to see, have been purchased by the authorities at South Kensington Museum. They will long remain a lesson to our own wood-carvers, and it will be an honour to shake the hand of our countryman who can beat them.

The ascent of the towers of the Trocadéro is very easily made by the hydraulic lifts. These glide up and down without the least perceptible motion, and make the ascent and descent in about two minutes. The lifts hold about thirty people, and a franc is charged for the trip and return. The height of the towers is about 300 ft. These lifts are forced up by a long cylinder, some 2 ft. in diameter. As this immense iron rod must necessarily sink down its own depth into the earth when the lift is level with the floor, some idea of the costliness of the foundations may readily be formed. Upon the top of the towers are some polished marble columns. I notice that although they have only been *in situ* about six months, the polish has already left the surface of the marble. This applies everywhere else where marble is used externally in Paris, and goes to prove that atmospheric influences in France have the same effect upon polished marble as they have at home. Some huge blocks of marble are shown in various parts of the Exhibition. In an Italian court in the grounds there is a block of dove-coloured marble, 14 ft. by 3 ft. 9 in. by 2 ft. 3 in., and one of white statuary, 14 ft. by 3 ft. 6 in. by 5 ft. These are Serravezza marbles. Algiers shows a block of white veined marble 11 ft. by 2 ft. by 3 ft., and a fine monolith, 17 ft. by 4 ft. by 3 ft. 6 in., is exhibited by Dussert, of Bagnères de Bigorre, Hautes Pyrénées.

"Man, know thyself,"—one is apt to say upon going into the Italian Court, and looking at Mr. J. De Nittis's series of pictures of London. Coming straight, I suppose, from the blue skies of his native country, he found London under a cloud,—like himself, perhaps!—and he has immortalised his impressions by painting the metropolis just as if it were

"Down in a coal-mine, underneath the ground."

The production called "Canon Bridge" (he means Cannon-street Bridge) is an awful paradox; and the others are almost as bad. In his view of the Mansion House Corner he has unwittingly introduced the same old gentleman with white whiskers in two several prominent places in the crowd. The kindest view of all is of some ladies in a boat, and is labelled "Green Park." The surroundings, however, prove that De Nittis is again in error, and that he should have described it as "St. James's Park." Before the next Exhibition comes on, if it ever does come, I should like this gifted artist to visit Sheffield, and try his hand at a landscape (!) from the Victoria Station point of view. It is as well sometimes, as Burns wrote long ago,—

"To see ourselves as others see us."

HARRY HEMS.

THE WORK OF THE SCHOOL BOARD FOR LONDON.

SIR CHARLES REED, chairman of the School Board for London, in the address which he delivered to the members the other day, on the occasion of resuming business after the usual autumnal recess, touched upon some matters which will be of more than passing interest to many of our readers.

As to school accommodation, he said that at the present time the Board has under its control 278 schools, with 704 departments; of these, 187 are permanent schools, 43 are held in temporary buildings, and 48 have been transferred to the Board. These schools give accommodation for 192,000 children. This is an increase since this time last year of 36 schools, 112 departments, and 29,092 places. When the Board have completed works now in progress, it will have provided school-places for 240,000 children. Including those provided by voluntary schools, London has now 203,132 efficient school-places more than it had seven years ago, the increase being 77·4 per cent.

While in forty-six cases during the past twelve months the Board has had to enlarge schools, "in no instance," says Sir Charles, "has the migration of the people left us with excessive accommodation,—a fact that speaks well for the care with which sites have been selected, and the moderation with which requirements have been estimated. The cost of sites has of course depended on whether they were purchased in advance of general building, or whether the ground had to be cleared of houses. Sites and buildings together have averaged 15*l.* 4*s.* per child,—a cost which the Education Department recently informed one of the London vestries it could not regard as excessive. The buildings are well adapted for their purpose, although, for the sake of economy, constructed in several stories. One of H.M.'s Inspectors says:—

'I did not realise how defective the lighting of many voluntary schools was, until I came to compare them with the airy, brightly-lighted chambers of the Board schools. This has led to the improvement of the light in several voluntary schools.'"

As to the importance of "Domestic Economy" as a "specific subject," Sir Charles says,—"Few will grudge a girl some knowledge of this subject, which is simply 'food and its preparations,' of the warming, cleaning, and ventilating of a dwelling, or of the rules of health and of the management of a sick room, cottage income, expenditure, and savings. The Board encourages this subject, and hopes thereby to check those habits of waste which so often impoverish the family of the artisan. The same aim has led us to give instruction in cookery to our mistresses and senior girls. Under the scheme recently adopted by the Board, the girls in schools where domestic economy is taken, will receive their preparatory lessons from their own teachers, taking a subsequent course in practical cookery at centres in kitchens fitted with the ordinary appliances of a working-man's home."

Incidentally, allusion is made to the good work which has been done by the London Schools' Swimming Club. It is not in the power of the Board to contribute to its funds, but, says Sir Charles Reed, "we reap great advantage from its activity in securing in our public parks and baths places where swimming can be taught. Attention having been recently called to the great importance of this art, it may be of interest to state that this club has, without a penny of cost to the ratepayers, taught 7,577 children and teachers how to swim, and that this season there were enrolled 1,600 children, 105 being girls, and 120 female teachers. It need hardly be said that the suggestion that we should erect swimming-baths in connexion with our largest schools would carry us far beyond the line of our duty; but it may be hoped that some encouragement may be given by Government to this branch of physical training."

The interest taken by the Board in its scholars is further shown by instruction being given by approved lecturers as to the advantages of temperance and thrift. "Though we have established no savings-bank of our own, we have given facility for the deposit of money with the National Penny Savings Bank; and taking forty schools in various parts of London, the number of depositors in 1877 was 9,601; the amount deposited 3,112*l.* 1*s.* 10*d.* It has been the work of a committee during the past year to select, with great care, books for the libraries which are now connected with every school. These are different in each case, and are passed on

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every six months from school to school and centre to centre through our ten districts, so that a constant and fresh supply of healthy reading is supplied for the use of the elder children."

MUSIC FOR THE BLIND.

We are glad to learn that the invention of Professor Gambale, of Florence, introduced by us to the notice of the public, with a view of improving the instruction of the blind in music, is being examined by the Principal of the Normal College of Music for the Blind, Norwood.

It may be added that the movable types of Professor Gambale's writing-desk are the well-known ones of the alphabet, and the figures used in arithmetic. With it, a master possessing sight can with the greatest facility teach the blind not only to read, write, calculate in arithmetic and algebra, but also music from the first elementary principles up to a complete knowledge of harmony and counterpoint in eight parts.

The Blind thus taught can by themselves, with this desk, set up the types, print either prose, arithmetical propositions, music however difficult or complicated, and from what is written any number of copies in relief can be printed, equally legible by the blind as those possessing sight, and also readable in all countries. We have seen thirty-two bars of the chromatic fantasia of Bach printed by this system for the blind on a sheet of paper, 35 centimètres by 25 centimètres; a proof that it is not voluminous.

CRYSTAL PALACE CONCERTS.

So many of our readers are musical that it is not out of place to draw attention to the fact that the winter series of Saturday afternoon concerts at the Crystal Palace has just commenced for the present season. These concerts, which are of the very highest class in regard to selection and execution, have perhaps given more and wider fame to the Sydenham establishment than anything else that has been done there, and are recognised all over the Continent as the most important medium for the introduction of new instrumental works to the English public. We may be allowed, perhaps, to regret that the place of performance is not more practically suitable. The materials of which the building is composed render the Crystal Palace concert-room bad for effect; the glass and iron are not resonant, and impart a jar and harshness to the tones of the brass instruments especially, and the ventilation of the room is very bad, almost culpably so. As the building was not originally constructed for music the first defect is inevitable, and no one's fault, but something might be done to improve the ventilation. It is one proof of the high interest of the performances, that these drawbacks seem, it must be admitted, to have no influence in diminishing the numbers or enthusiasm of the audiences; but they are serious drawbacks, nevertheless.

Town Spoiling Country.—Professor Colvin distributed the prizes to the successful students of the Brighton School of Art on the 11th inst., and afterwards delivered an address on "Art Culture," in the course of which he remarked that:—

"Another matter which was of sovereign importance in a great and growing centre of population was the formidable fact that, as our population grew, as our centres extended, a positive amount of beauty was removed off the face of the earth, and a positive amount of ugliness, disorder, of mean irregularity of building, mixing up desecrated country with uninhabitable town, took place, and scathed and devastated the land. Let them go into any suburb, into any place where the fingers of some great town are crawling and clawing out without regularity, without order, without any real sense of fitness between the houses and the country in which they are being built, and see if it were not so. Old bits of lane and country-side, old sweet, peaceful hollows, in which the houses were full of the charm of sober picturesqueness and quiet, suddenly, in a month, in a night almost, got transformed and defaced with these villainous new structures. He was not complaining of the fact that people wished to live in the country, but he was complaining that when they did go the houses in which they went to live made of that country an eyesore and an abomination. There was no necessity that these things should be so. He believed that a little more susceptibility on the part of those who cared to live in such houses—a little more sense of what was vulgar and absurd in the disposition of windows and would-be ornaments, in the pretence of a richness which was the reality of meanness—a little finer instinct of that kind would soon modify those difficulties, and there was no reason why the extension of dwelling-places into country-sides should make those country-sides abominable."

EXPERIMENTAL BUILDING: ARCACHON VILLA, NEAR LEEDS.

It is so seldom that any departure from ordinary models in house-building is attempted that we willingly illustrate a recent erection at Moor Allerton, wherein have been introduced several novelties. The proprietor, Mr. John Smith, built the house specially to test "a self-regulating double-current system of ventilation," and his suggestions in other respects were carried out by his architect, Mr. Walsh. We allow Mr. Smith to tell his own tale.

The special objects for which Arcachon Villa was designed are,—

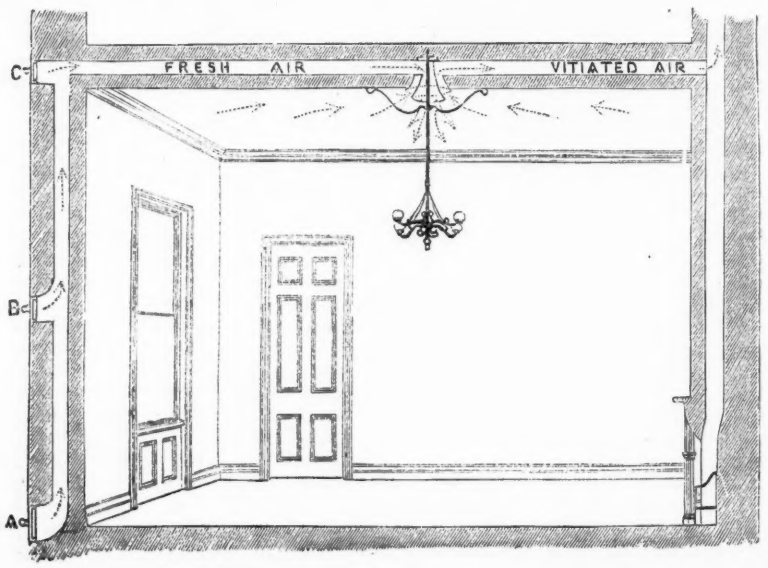
1. To introduce a more pleasing and picturesque style of country-house or villa within reach of the means of merchants and gentlemen.
2. To construct it on the most approved system with respect to sanitary arrangements, ventilation, and water-supply; and
3. To economise labour, fuel, and water, and to prevent waste.

One of the ideas adopted by the proprietor is that chimney-shafts should always be in the centre of a house. These form a triangle, round which the rooms are built. It prevents draughts, makes a warm house, with even temperature.

Another idea is the use of the earth-closet, thus formed:—A kind of pit is made, which is well cemented (with no drain from it), over which is fixed the closet, with cinder or earth sifter at the side, roofed and well ventilated. A door at the back allows the refuse to be filled readily into a cart. The practical results are,—no nuisance, always dry, and good tillage.

The ventilation is obtained by means of Mr. John Smith's new patent double-current system of ventilation. The fresh air is admitted at the ceiling; the vitiated air escapes also at the ceiling. In practice it is found the fresh air comes in in such proportion as the vitiated air escapes.

The fresh air being made to ascend (contrary to the usual methods) prevents draughts.



The kitchen is specially designed, so that a lady can superintend her own *cuisine*. It is large, well lighted, and well ventilated; floors, tiled red and buff, with upper pantry; a scullery on one side, well supplied with hot and cold water. A spring water-indicator shows the exact depth of water in all the cisterns at a glance. An electric bell attached to a float gives twenty-four hours' notice before any accident could happen to the hot-water boiler. A double passport communicates with the dining-room, and a coal cooking-range, gas-stove, and French charcoal stoves are fitted up, so that if a dinner is required for only one person or for sixty, it can be cooked without inconvenience or waste.

All the joists are put into cast-iron pockets, instead of mortise and tenon, to retain the strength of the floors. Every room is ventilated.

The upper rooms lead on to three balconies, formed of iron girders and concrete (5 ft. wide). These command extensive views.

The roof overhangs from 4 ft. to 6 ft.; and one peculiarity of its construction is that it is intersected or cut across at two-thirds from the ridge, in order to catch the water for storage at the top of the building. The cisterns are roofed over, and detached from the house, well ventilated, easily cleaned out, and connected with an extra supply cistern, so avoiding that nuisance of country houses,—continual pumping to fill the cisterns. One point in the economy of water is the construction of a bath boiler and hot box (Walsh's patent), which allows the occupant to draw water at nearly boiling-point in the bath-room, and then pump up cold rain-water from the storage cistern, thus saving two-thirds of the water in the cisterns above from being wasted. All the rest of the rainwater enters into and passes through a strong vaulted chamber in the basement, well cemented and ventilated, which keeps water perfectly fresh and sweet. It is shut off from the house, so that no evaporation can take place.

From whichever side this villa is approached it gives a pleasing impression, especially so when passing by Roundhay Park, the property of the Leeds Corporation. The turret on the summit is provided with a lightning-conductor and an alarm-bell communicating with every floor. The cost was as follows. The conservatory and greenhouse are not yet erected:—

Burnet & Sons (mason and brick work)	£803	17	6
Joiner's work (executed by proprietor)	650	0	0
Ironwork, balconies, girders, &c. (Cooper & Dawson, and Tankard) ...	97	0	0
Slating (Pycock & Son)	123	5	0
Plumbing and glazing (all plate-glass).	160	10	0
Hot-water engineering (Walsh & Sons)	72	13	0
Plastering (Franks)	110	0	0
Painting	39	0	0
Marble masonry (Heaps & Robinson)..	67	0	0
Electric bells.....	18	10	0
Extras not included in above, as grates	50	0	0
	£2,191	15	6

Stables and lodge are built to accord in character.

REFERENCE TO PLANS.

Ground Plan.

1. Dining-room.
2. Drawing-room.
3. Breakfast-room.
4. Kitchen.
5. Pantry.
6. Scullery.
7. Store-room.
8. Conservatory.

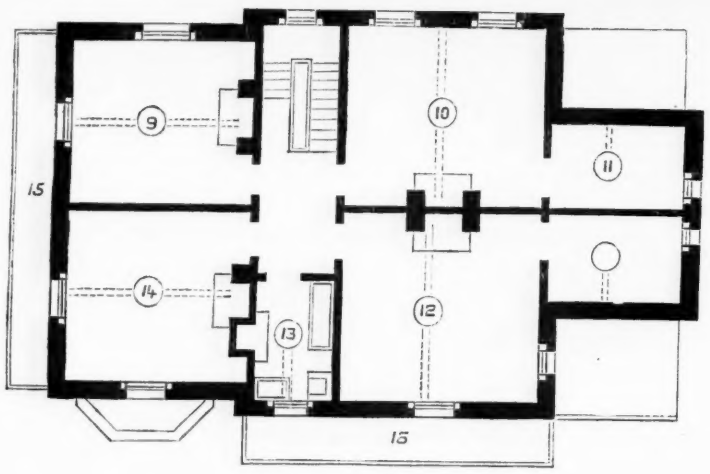
Chamber Plan.

9, 10, 12, 14, Bedrooms.
11. Dressing-room.
13. Bath-room.
15, 16. Balconies.

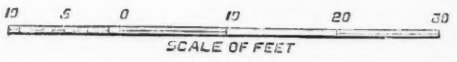
NEW GREEK CHURCH, SAN FRANCISCO CALIFORNIA.

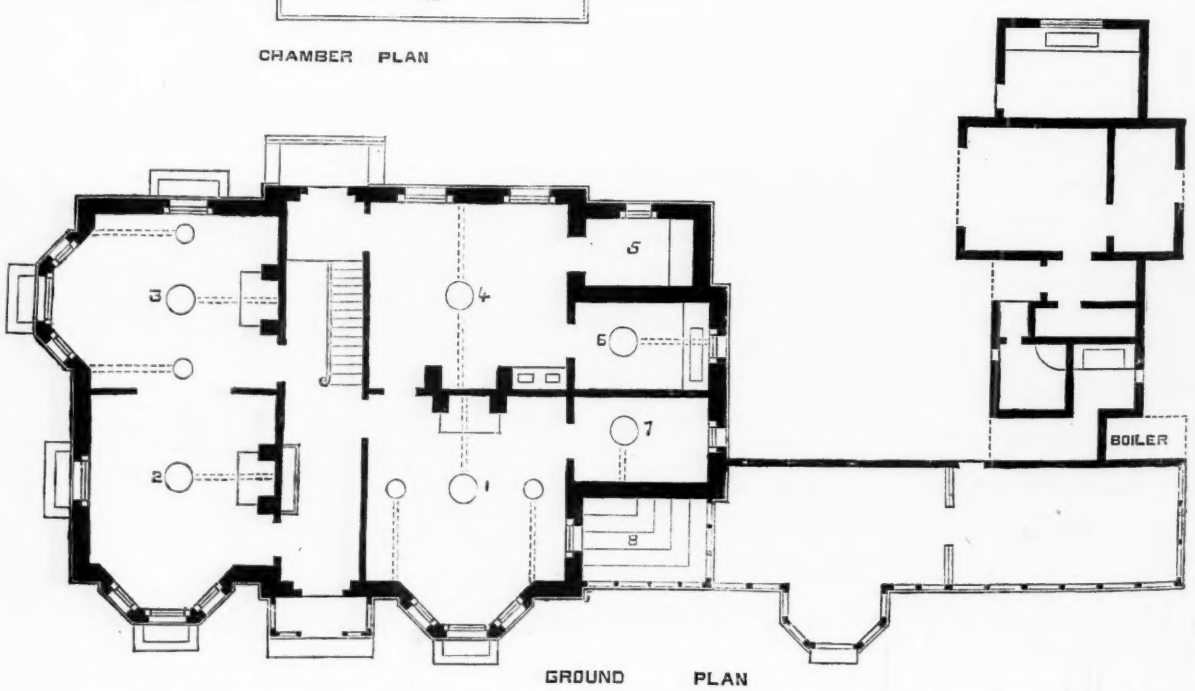
The materials from which the drawing we have engraved was made were sent to us from San Francisco many months ago, with a request that we would make known what was doing there architecturally, by publishing a view. It represents a handsome and costly building of its kind, and does credit to its designers, Messrs. Hoehhofer & Apponyi.

Recreation Grounds for Sheffield.—At a meeting of the Sheffield Town Council on the 9th inst. it was announced that the Duke of Norfolk had set apart three pieces of land as recreation grounds for the people of Sheffield. The land is situated at Parkwood Springs, Carlisle-street East, and in Beighton-lane districts, where thousands of working people will be able to use these open spaces. His Grace has given these grounds, which are upwards of twenty-six acres in extent, to the corporation on condition that they be preserved as recreation grounds for the people of Sheffield for ever. The thanks of the corporation were voted to his Grace for the gift.



CHAMBER PLAN





GROUND PLAN

EXPERIMENTAL BUILDING: ARCACHON VILLA, MOOR ALLERTON, LEEDS.—Mr. Walsh, Architect.

NEW GREEK CHURCH, SAN FRANCISCO, CALIFORNIA.—Messrs. Hoenhofer & Apponyi, Architects.

ON SOME HYGIENIC CONDITIONS OF THE POTTERY MANUFACTURE.*

Among the hygienic conditions and surroundings of various manufactures, experience and observation have convinced me that we must make a distinction between those inseparable from, and those only incidental to, the manufacturing processes themselves, and that for the greater number of occupations and operating more energetically as factors in inducing disease, the latter play the more important part. This statement, in other words, amounts to this,—that with regard to the multiform occupations pursued in this country, the nature of the occupations is undeservedly blamed, in the case of the majority of them, for the ill consequences to the health of those engaged in them. Now I purpose in this paper to deal with a manufacture in which the essential conditions and surroundings are really fraught with danger to health; nevertheless, I shall be able to show that the non-essential or accidental surroundings are accountable for very much. To guard myself against misunderstanding, however, I need remark that the line between essential and non-essential conditions of manufacture cannot, in all particulars, be distinctly drawn; and that, in more or fewer of them, some will overlap others. For example, take the case of dust, which is the most prolific agent in inducing disease among potters, we may fairly regard it as inseparable from the processes of the trade, because the material cannot be handled in accordance with the necessities of trade without giving off fine dust; yet, on the other hand, the amount of dust thrown off may be lessened by care, attention, and cleanliness, and, further, may be dispersed and driven away by efficient ventilation. Still, notwithstanding this inability to accurately separate the essential from the non-essential conditions of manufacture, I regard it as important and practically most valuable to make the attempt; and, firstly, let me briefly sketch the conditions or surroundings of the pottery manufacture, which are non-essential, accidental, or outside the calling, but yet are answerable for more or less sickness, suffering, and death amongst those engaged in it. Of this whole class of morbific agencies I may predicate that they are preventible. I do not assert that practically they can all be removed and annihilated, but that we possess known remedies against them capable of being more or less efficiently applied.

The first in order I shall name is defective construction of workshops. In respect of this matter the manufacturers in the Potteries suffer, as do also those in other places, whatsoever be the occupation carried on, by the sins of their forefathers. They inherit old buildings erected ere sanitation had made good its existence. Their demolition and reconstruction is an affair representing capital expended, and the tendency is to "make them do" until better days dawn, or progressive dilapidation enforces destruction. Now, a fairly diligent inspection of the buildings used for the making of china and earthenware,—or, to use the comprehensive term of the district, of the banks,—will reveal too many shops or workplaces wretchedly built, at times in bad repair, with wet dirty floors, damp walls, low ceilings, scarcely high enough for a tall man to stand under, full of draughts, yet not ventilated, and with every trade appliance or fitting covered with a coating of dust of variable thickness. If these be the features of but a few, there are more to be found which, though less unfit as places of labour, are yet far from being what they ought to be. Defective elevation of rooms, and in its train draughts and bad ventilation, are far too generally found. Another common structural defect is the absence of a plaster ceiling in workshops having others over them, and, as a consequence, the precipitation of dust from the upper floor to that beneath it. Another prevailing structural defect is to be found in the unpaved yards and in the absence of water-spouts and drains to conduct rain-water away into the sewers. The consequence is, wretchedly sloppy and muddy courts and approaches, and concurrently wet feet and drabbled dresses, and the accessories,—colds, coughs, and rheumatism. Again, efficient ventilation is a thing far too widely neglected in pottery workshops, particularly when considered in connexion with the prevalence of dust, pervading especially those shops in which the clay is thrown, moulded, or turned, or in which scouring and dipping of the ware are carried on. The position, the size, and the construction of the windows as to the mode of opening and closing them, are such as make ventilation difficult, or even almost impossible. Add to these impediments to ventilation the frequent mode of warming by what are called pot-stoves, which, standing about the middle of the rooms, heat and unduly dry the air around them by their highly-heated or even red-hot iron surface, whilst causing at the same time very little atmospheric movement upwards through the small iron chimney-flue, and yet ever and anon dispersing into the apartment an inconvenient supply of smoke.

It is no new thing to condemn these pot-stoves as insanitary; but, for my part, I am almost equally disposed to condemn their modern innovators, the hot-water and steam pipes, which have found their way into several recently-erected factories. For this system of warming, when adopted, as too frequently happens, without corresponding arrangements for ventilating, is but a system of enervating the workpeople submitted to it, and provocative of evils as great, perhaps, as that of the cold it is used to guard against. Indeed, I maintain that it is better for a man at active employment to do without artificial warmth from a heating apparatus of the sort in question. The mischief to contend against is the separation of the heating from the ventilating process. When the former is attained apart from the latter, or the latter is let shift for itself, the air of the apartment soon becomes insufferable, doors and windows are opened, and draughts and colds follow, and inflict their injurious consequences upon people peculiarly sensitive to them by reason of the heated, almost motionless, air previously surrounding them. So far as concerns the pottery hands, it must be admitted they are difficult to deal with in this matter of ventilation. They have a morbid dread of cold air, and are, unluckily, in large numbers the victims of chest affections. As a consequence, they are prone to stuff up ventilators, to cover over any sort of apertures by which the outer air is to be admitted into the room, and to deliver themselves up to a warm, stagnant, effete air laden with particles of dust.

That man would be a public benefactor who could invent a simple plan for ventilating and warming the workrooms of potters, and persuade them at the same time to give it a fair trial. Overcrowding of shops is a further insanitary condition not essential to any process in the manufacture of pottery. According to my observation, it is likewise a widely-spread one; but I trust that the better-defined sanitary requirements of the new Factory and Workshop Act will gradually diminish this evil.

In the manufacture of pottery the use of machinery has heretofore found little application. It is now slowly making its way; but for its adoption to any large extent it will be necessary to replace old factories by new ones, the arrangement and relative situation of the shops of most old factories rendering the adaptation of machinery impracticable or else too costly. The use of machinery would exert a beneficial influence upon the health aspects of the manufacture. The introduction of presses for preparing the clay, in place of the old process of evaporation and blunging by men exposed constantly to an atmosphere of steam and to the influx of cold air at the same time from the half-enclosed shed in which the work was carried on, is a movement in favour of the health of potters. So, again, is the adoption of the pug-mill, to replace in great measure, or wholly, the process of wedging the clay. I can point to other examples, in the use of steam to turn the jiggers, the turners' lathes, and the thrower's wheel; and I could well wish to see the like mechanical agency more widely patronised; for my experience as an infirmary physician has shown me, in numerous instances, the injurious results to health of girls and young women employed in lathe and wheel turning.

Not actually pertaining to machinery, yet allied to it, are the arrangements now pretty generally used in substitution of the old "hot closets," in and out of which boys were kept continually running, with great detriment to health, from the excessive heat and ever-recurrent exposure to chills. These improvements in machinery and in mechanical appliances must be seen to be understood. I will now pass to another set of conditions unfavourable to health, for which neither the manufacturing processes nor the structural defects of the factories are to blame. I allude to the habits, the food, and the clothing of the workpeople. But to sufficiently discuss these matters would carry me far beyond the limits of a paper like the present. Let me say, in brief, that there is very far too much indulgence in intoxicating drinks, irregularity in living, indifference and carelessness in the selection and preparation of food, neglect of cleanliness, pride and folly in dress. I do not say these defects are peculiar to potters. I fear they prevail generally among factory hands as a class; but I fancy they are, as a whole, more productive of disease among potters than among many other artisans, because by their association with concurrent causes of sickness found in the occupation itself their power to do mischief is enhanced. For instance, the most fertile source of disease is the dust of potteries, and the morbid resultant affections of the lungs, wherefore the indulgence in alcoholic drinks, which load the vessels and lungs with carbonaceous matter, and otherwise prejudice the respiratory act, prepares the way and facilitates the action of the active morbific agent, the inhaled dust.

I will now turn to the conditions essential to the occupation of potters, or, if not positively essential, at least practically inseparable at present from it. The first to be noted is dust. This is evolved from the materials used in the manufacture of pottery: the china and blue clays, the stone and the powdered flint. It is a mineral dust and extremely fine, consisting mainly of silicious particles. It enters the air-passages, and finds its way into the bronchial tubes, great and small, where, as a direct irritant, it sets up a slow, inflammatory action, ending in altered pulmonary tissue—so altered by condensation and other changes, as to be useless for the purpose of respiration. This dust is apparent in the air, and is seen covering all objects in the workshops as well as the clothing of the potters themselves. Some processes are more dusty than others, but none of them in which the clay is worked up into the forms desired are free from it. In the finishing departments of painting, gilding, and burnishing the clay is transformed into china and earthenware, and no dust consequently can arise from it. We have, therefore, an obvious and direct cause of disease existent in the dust given off from the yet unbaked clay, and its evolution to some extent appears inevitable. As a matter of course, it is used in a moist or plastic condition; but its surface rapidly dries, and readily breaks down into a fine powder on touching, as shown by its soiling the hands. In some processes, particularly in that of turning, the lathe separates fine shavings from the surface of the vessels, still in the "green" state, and with them more or less of the clay in fine particles and in powder. The disposition of the surface to dry and form a pulverulent film is increased by the heat of the workrooms. Therefore, for preventive measures, we must seek such as will lessen the heat of shops, and the formation on the surface of the unbaked ware of a dry, powdery film, and withal such ventilation as shall disperse the dust generated and expel it from the workrooms. Airy, well-ventilated, and comparatively cool shops constitute the primary hygienic requirements in the manufacture of pottery. Subsidiary to these are plans for laying the dust by sprinkling the floor, the observance of all means of cleanliness, both of the shops and of the persons employed; but it is painful to add that these minor measures to remove a patent cause of disease are greatly neglected. I would throw it out suggestively, how far it might be possible to remove the dust from the atmosphere by employing from time to time forcible jets of steam. These we may imagine would induce the precipitation of much dust and lessen the dry heat of the air.

China-scouring has been especially singled out as most noxious to those engaged in it by reason of the dust generated, and the peculiarly irritating quality of that silicious dust. It is an occupation of women, and consists in scouring the flinty dust from the surface of the china cups and other articles. It is very provocative of lung disease, although not in the terrible ratio some have reported. The mode in which the work is carried seems certainly to place it within the scope of remedial measures. These must be in plans for withdrawing the dust from the workers as they sit at the bench with the ware before them, and it seems to me very feasible to effect this by having a perforated bench allowing the dust to fall through, or rather to be forcibly drawn through into an

* By Dr. J. T. Arlidge. Read at the Stafford Congress.

enclosed trough or cylinder below, in which a constant process of exhaustion of the air is effected by the rapid revolution of a fan at its open end driven by machinery. The perforated bench and subjacent trough have been adopted, but the withdrawing force relied upon has been the suction power of a heated chimney with which the trough has been connected. But this plan is better in theory than in practice. The chimney has not a constant and equal draught, and if the shop become heated when the chimney is cool, the current will be reversed, and no dust will be extracted through the perforations.

Another expedient preventive of the ill consequences of dust inhalation is the use of respirators worn over the mouth and nose. There can be no doubt of their efficiency in sifting the dust from the air before it enters the respiratory passages, but the difficulty is to get the workpeople to use them. There is on their part a recklessness and an indifference to consequences; the respirators increase the effort to breathe, and they feel hot and uncomfortable. But what is more fatal to their adoption is, they are innovations on the usages of trade, and above all they subject their wearers to the jibes and jeers of their fellow-workers, and no class of people are more sensitive to jests, or have so little moral courage in regard to the introduction of novelties, as factory workmen and workwomen. In very many factories the evils of dust might be reduced by the rearrangement of shops and of the several branches of labour. As said before, some branches are more dusty than others, and it is not uncommon to carry on two or more branches in the same workplace, so that all therein employed are exposed to the whole of the disadvantages of processes which otherwise would be restricted to a few.

But besides dust, there are other conditions of labour inherent in it. For instance, the position taken during work is unfavourable to the normal action of the chest walls. This happens to throwers and pressers. In the handle-making branch there is rapidly repeated pressure upon the lower part of the chest; and in all the finishing processes the position in sitting is more or less constrained. On the other hand, in the case of lathe-treaders, there is undue fatigue in standing and in the exertion by a sort of perpetual jumping on one foot of treading the footboard or treadle.

There is yet one more department of pottery labour destructive of health, which I must mention in order to give my paper any semblance of completeness. It is the department of dipping. In order to put the impervious glaze on the ware after firing in the biscuit-oven, it is dipped into a mixture of lead and borax, combined with other materials, which have previously been all fused together into a vitreous substance, then ground down into fine powder and mixed with water. The lead of the glaze is of course a poisonous ingredient, and as a consequence those engaged in dipping the ware are the subjects of severe colic and of paralysis in various and often very aggravated forms. Could lead be eliminated from the glaze, one great source of disease of the potter's craft would be abolished. I am told that the proportion of lead used is not so great as formerly, and that an increased quantity of borax may be substituted for the poisonous metal. Whether this be so or not is a question for chemists, and it would be a happy day could these scientific gentlemen contrive a new form of glaze of non-poisonous quality. Probably some lead is absorbed by the skin of the dippers, whose hands and arms are, practically speaking, immersed in the glaze during the period they are at work. But my impression is that the lead finds its way into their system chiefly in the form of dust inhaled by the mouth and nose. The glaze most rapidly dries on the absorbent surface of the ware, whilst the clothes of the worker become bespattered with it, and every surrounding object betokens the formation and presence of dust. Here, again, the like remedial measures claim attention as in the case of dust from clay. There is need of airy shops and good ventilation, and, above all, of cleanliness of person and of surroundings. Most manufacturers supply their dippers with means of washing, with towels, soap, and nail-brushes, and the Factory Act forbids the partaking of meals in dipping-houses. In fact, preventive measures are of the first importance in this department. If experience indicates that some individuals are much more liable to be affected by the lead poison than others, it proves even more forcibly that by care and cleanliness on the part of the men its ill effects may be largely obviated. The use of medicines calculated to eliminate the poison is well known to the workmen, and another excellent means of preserving their health is at their command in the way of hot-water, vapour, and Turkish baths. Respirators would serve them a good turn, but, as with other pottery artisans, their prejudices stand in the way of their use.

I have now made a rough survey of the principal un-hygienic conditions of the pottery manufacture. The general lesson to be derived from it is, that those conditions are largely remediable and preventible; that one group has most to do with structural and mechanical expedients to remedy it, and that the other is largely bound up with the willingness of the workpeople themselves to lessen and remove them. The reputed friends of the artisan class will do their clients far greater service by teaching and encouraging them in more sober and regular habits, in the observance of greater cleanliness in their work, in attention to the laws of health, in overcoming trade prejudices, in selecting and preparing their food, and in properly and sensibly clothing themselves, than by all their rhetoric in words and writing in favour of higher wages and of hypothetical advanced political action and power.

PROGRESS IN PURIFYING SEWAGE BY PRECIPITATION.*

The object of this communication is to lay before the Congress certain practical and economic results which the writer has arrived at in regard to perfecting the purification of sewage by chemical treatment, and in facilitating the disposal of the sludge derived therefrom. He desires to acknowledge the valuable co-operation he has received from Professor Wanklyn and Mr. J. C. Mellis, C.E.

In considering every system for dealing with sewage it is desirable that the question should be regarded as a means of enabling sanitary authorities to overcome the great and increasing difficulty in the disposal of their sewage refuse at the least cost, rather than as one for making money out of sewage, which has been too much aimed at, and has thereby thrown back sanitary improvement considerably.

In the course of the writer's experience in advising with reference to precipitation works and systems, he has seen more and more clearly that sulphate of alumina aided by milk of lime proves the most efficient agent to comply with the before-mentioned conditions for purifying sewage. This he has now advanced upon, inasmuch as he has discovered that the efficiency of sulphate of alumina is greatly increased by the presence of some protosulphate of iron, which apparently produces results *altogether out of proportion to its chemical equivalent* (the salts of iron being known to chemists as purifiers of foul fluids), the proportions varying with the composition of the sewage, but their combination having a marked sanitary and economic advantage.

Practical data on a large scale have already been obtained at the sewage precipitation works of the Rivers Purification Association (to whom the writer is engineer), at Coventry and Hertford, where the improved system of working has been adopted with complete financial and sanitary success. The process previously employed at these places was (as is well known with reference to Coventry) crude sulphate of alumina and milk of lime, which gave results admittedly of a highly satisfactory kind. The addition of the salts of iron has, however, led to the production of an excellent effluent, and at a cost even less than previously.

The employment of this combination has also resulted in the tanks and the sludge being deprived of the slight smell hitherto noticeable at times. The economic results attending this compound system of precipitation will be recognised when the writer states that at the Coventry Sewage Works the purification of the very foul sewage (containing between six and seven grains of chlorine per gallon, and between twelve and thirteen parts per million of albuminoid ammonia, with a large amount of dye from the manufactories) is now accomplished for 1*l.* 1s. 6d. per million gallons.

At Hertford the improved system of working has been applied with equally satisfactory results.

* By Mr. Henry Robinson, C.E. Read at the Sanitary Congress, Stafford.

The way to dispose of the sludge from precipitation works has long engaged the attention of the writer. Artificial heat will accomplish it, and several ingenious appliances have been devised for this purpose. The cost, however, is heavy, and the value of the resulting manure is not yet sufficiently established to justify its employment on commercial grounds.

The writer has now adopted the system of removing the water from the sludge by means of filter-presses, and he has devised a simple application to economically effect this.

This press, which is founded on an old and well-known Belgian apparatus for filtering impure liquids by means of a combination of discs with filtering-cloths on their surface, has been arranged in order to economise labour and time in working, so that the discs open and shut automatically, by which the pressed sludge is removable quickly and without disturbing the filtering-cloths. The fluid sludge is thus converted rapidly and economically into the form of cakes, and the drying can be further carried on to any desired length either by exposure to the air or otherwise. The difficulty hitherto experienced in disposing of the sludge to farmers for utilisation upon land is thus got over, as the writer has found that there is no difficulty in selling the sludge from the process he is referring to, provided it is made portable. The theoretical value assigned to sludge from the writer's process is, according to eminent chemists, 16s. 9d. a ton if it contains about 50 per cent. of moisture, or 27s. a ton if dried down to 15 per cent. of moisture.

A NEW BRICK-KILN.

Two systems of continuous kilns for burning bricks, tiles, &c., have come into practical use—the French system of Colas, also known as that of Borie; and the German system of Hoffmann, the well-known annular kiln or Ringoven. The principle of the kilns of Colas, Borie, and their imitators, consists in placing the air-dried bricks on small railway trucks forming a long train. This is slowly moved through an arched chamber, provided in its centre with fixed fireplaces for burning the bricks; the fire in these kilns is stationary, while the bricks are moved forward. The principle of the Hoffmann kiln is just the reverse; here the bricks are stacked in an annular burning-chamber, and remain stationary while the fire travels through them, leaving burnt bricks in the rear and advancing into and amongst the green bricks. The annular shape of the burning-chamber allows a continuous operation of the kiln, the fire progressing in the circuit without interruption, while the burnt bricks behind the fire are continually replaced by green bricks. The first-named system is also worked continuously, the train being supplied in the rear with trucks containing green bricks, at the same rate as trucks with burnt bricks are withdrawn in the front.

All kilns of this kind, however, compared with Hoffmann's, have met with little success, much objection against them having arisen from frequent interruptions in their operation, caused by the fact that a long train of loaded trucks cannot be moved continuously through a fire in an arched chamber, with sufficient certainty. A brick, accidentally falling from a truck, or a piece of coal or cinder getting in between a truck and the kiln wall, will stop the whole train. The principal advantage of these kilns, the saving of labour on account of less handling of the bricks, is more than paralysed by the frequent interruptions in the operations of the kiln just referred to. Besides this, it has been found very difficult to keep the joints air-tight between the trucks and kiln walls, as well as those between the trucks themselves while these are in motion, and for this reason it is almost impossible properly to protect against the fire their axles and axle-boxes.

A kiln, invented by Herr H. Dueberg, of Berlin, is (according to the *Engineer*) probably free from these objections, while it combines the advantages of the Hoffmann system of annular kilns, viz., saving in fuel, uniformity in burning, and certainty in working, with the saving of labour obtained by the kilns of Colas, Borie, &c. These objects are obtained by constructing an annular kiln with a movable floor, which consists of a series of sections or platforms. These platforms are supported by wheels and axles, which run on a railway track extending along the floor of the burning chamber; the platforms, therefore, are railway trucks, similar to those used in the kilns of Colas and Borie,

but larger than these. The principal difference, and at the same time the principal advantage offered by Dueberg's kiln, compared with those of Colas and Borie, is that the platform trucks are not moved during the burning of the bricks. On the contrary, they are at rest during the entire process of burning, while the fire is advancing through the bricks, in the same manner as it does in the Hoffmann kiln. The fuel is dropped into and amongst the bricks to be burnt from above, through small holes in the arch of the burning chamber.

The trucks, after being loaded with green bricks, are run into the kiln one by one, each close up against the preceding one; the back of each truck is coated with clay before the next truck is pushed in, and thus the joint is made air-tight. The two sides of the platforms parallel to the wall of the burning-chamber are made air-tight by filling the joints between the platforms and the kiln walls with sand, after a truck loaded with green bricks has been run into the kiln, close up against the platform of the preceding truck. There is no danger of the joints between the platforms and the kiln walls, as well as of those between the platform themselves, not remaining air-tight during the process of burning, because everything is then at rest. On the other hand, the working of the kiln cannot be interfered with, as has been the case with the kilns of Colas, Borie, and their imitators, by accident, such as from falling bricks or cinders, which constitute the principal objection to the more general use of the above kilns. In Dueberg's kiln the trucks are not moved until the bricks are completely burnt, and sufficiently cooled down to be removed, when the trucks are drawn out one by one; they are, therefore, never moved all at the same time; and, moreover, the trucks are never moved while still hot, but only when cold. In the kilns of Colas and Borie all the trucks must be moved at once, and while a portion of them is passing through the fire, their axles being heated and no lubrication possible. In Dueberg's kiln the axles of each truck may be lubricated before the same is drawn out of the kilns, as they are then quite cold. For these reasons the trucks of this kiln may be made much larger than those of the kilns of Colas and Borie, and consequently the area of the burning-chamber, may also be made much larger than that of the said other kilns. It is evident that one truck containing 5,000 bricks can be moved much easier than a train of about thirty trucks, each containing 500 bricks, the axles of about one-fourth of which trucks are almost red hot. It is evident that the labour in setting, as well as in drawing the bricks, is much easier in this kiln than in that of Hoffmann; the labourers are not compelled to work in the hot dusty atmosphere of the burning-chamber, which is very objectionable in all other arched kilns. In setting the bricks for burning, as well as in removing them from the kiln, they are only handled once, while with other kilns they are in each case handled twice,—first put on a wheelbarrow, and then taken off again and stacked.

METROPOLITAN BOARD OF WORKS.

Fixing Iron Ties through Party-Walls.—The Building Act Committee has reported, with reference to an application of Mr. C. Fowler, District Surveyor for St. Leonard's, Shoreditch, and the Liberty of Norton Folgate, for appointment by the Board of fees for special services performed by him in superintending the fixing of iron ties through the party-walls of Nos. 40 and 42, St. John's-road, Hoxton, and Nos. 75 and 77, Worship-street, that the District Surveyor was under no obligation to render the special services in question, and that the Board therefore cannot fix special fees for such services, and recommending that Mr. Fowler be so informed. The report was adopted.

Facilities for Bathing.—On the motion of Mr. Runtz, it has been referred to the Works and General Purposes Committee, "to consider and report upon the desirability of forming lakes in the Board's open spaces, where suitable for the purpose, which could be used as swimming-baths for both sexes."

The Sewage of London.—The Works and General Purposes Committee have had under consideration a letter from Scott's Sewage Company, intimating that they propose to appeal to the Corporation of London and the Thames Conservators to assist them to provide the requisite practical demonstration of the adaptability of the Company's system for dealing with the sewage of London; but before doing so they would like to be assured of the cordial co-operation of the Board. On the recommendation of the Committee it has been resolved that the Company be informed, in reply, that the Board still feel that they are unable to do more in the matter than consider any proposal that may be made to them for guaranteeing the purification of the London sewage at a moderate cost.

Proposed Railway from Charing-cross to Tottenham-court-road.—On the recommendation of the Works and General Purposes Committee, Messrs. Ludlow & Parratt have been informed, in reply to their letter as to a scheme for the construction of a shuttle line of underground railway in connexion with the proposed new street from Charing-cross to the Tottenham-court-road, that the Board deem it premature at the present time to enter upon the consideration of any such proposal.

A Much-needed Improvement.—Mr. Runtz has succeeded in unanimously carrying the following motion:—

"That it be referred to the Works and General Purposes Committee, to consider and report as to the desirability of making an application to Parliament for the construction of a spur street from the junction of Theobald's-road and Gray's-inn-road towards the 'Angel' at Islington."

Those who know the perils of the present route, *viâ* Elm-street, Mount Pleasant, and Coldbath Fields, will agree as to the urgent necessity of such an improvement.

The Water Supply of London.—At the meeting of the Board on the 4th inst., Mr. Selway moved:—

"That it be referred to the Works and General Purposes Committee to consider and report upon the advisibility of preparing a Bill to be laid before Parliament providing for the acquisition by this Board of the interests of the several companies now supplying the metropolis with water, also upon what steps it will be desirable should be taken to insure an improved supply of water to the metropolis."

Mr. Lloyd seconded the motion, whereupon Dr. Brewer moved "the previous question," on the ground that the present time, while the Board was still smarting in consequence of the treatment its Bills had suffered at the hands of Parliament last session, was premature and inopportune for the reopening of the question. Mr. Watkins seconded the amendment, which was also supported by Mr. Leslie. Mr. Runtz, in supporting the motion, said it was the duty of the Board to do its best to obtain a pure and abundant supply of water for the metropolis. "Let us," he said, "discharge that responsible duty. If we cannot obtain the powers we require, let the blame rest upon whom it may." The amendment was lost by 21 to 6.

The Garden Railings, Thames Embankment.—Mr. Runtz, in moving, on behalf of the Parks and Open Spaces Committee,—"That it be referred to the Engineer to report what steps can be taken to protect the ornamental railings now in use around the gardens on the Victoria and Albert Embankments," said that the damage done to these railings had amounted, for some time past, to 200*l.* a month, or 1,200*l.* a year! The damage is done by boys, who break off the elaborate castings by wholesale.

The Artisans' Dwellings Act.—At the meeting of the Board on the 11th inst., Mr. Richardson introduced a deputation from the Greenwich District Board of Works, praying the Board to deal, under the Artisans' Dwellings Act, with an unhealthy area known as "Hughes's Fields," in the parish of St. Nicholas, Deptford. Mr. Roberts, who acted as the spokesman of the deputation, described the exceedingly unhealthy and overcrowded state of the area in question, and stated that while that area only covered a space of 14 acres, as compared with 111 acres covered by the entire parish of St. Nicholas, it contained a population of 4,500 persons, whereas the total population of the whole of the parish was 6,370! Shortly afterwards Mr. Selway moved the adoption of a report by, the Works and General Purposes Committee, to the effect that the Committee have considered as to the course to be adopted with regard to the official representations from medical officers, under the Artisans and Labourers' Dwellings Improvement Act, 1875, upon which no action has yet been taken; that the Committee have instructed the Engineer and the Superintending Architect to prepare the particulars for draft schemes in respect of two areas in the parishes of St. Giles-in-the-Fields and All Saints, Poplar; and that having regard to the large amount of work now in hand in connexion with the eleven schemes for which Acts of Parliament have been obtained, it is not, in their opinion, desirable, for the present, to take steps for proceeding with any further schemes under the Act. Mr. Munro seconded the motion. Mr. Richardson moved the following amendment:—

"That the Engineer and Superintending Architect be instructed to prepare the particulars for a draft scheme in respect of the area known as Hughes's Fields, Deptford, in addition to the two areas in the parishes of St. Giles-in-the-Fields and All Saints, Poplar, in order that it may be proceeded with in the ensuing session, in conjunction with the two above mentioned."

In support of this amendment, Mr. Richardson referred to the extremely overcrowded and unhealthy condition of "Hughes's Fields," and said that the unhealthy state of the locality was most marked. The houses were mostly of wood, and very dilapidated, and the death-rate was 24 per thousand as compared with 20 per thousand in the adjoining parish of St. Paul, Deptford, and 15 per thousand in the parish of Greenwich. The medical officer of the district had strongly condemned the unhealthy state of the area in question, which at all periods of epidemic disease was attacked with unusual severity. Small-pox and fever here found congenial hotbeds, and during the prevalence of cholera some of the streets had been closed by barricades against the admission of the general public. Mr. J. Ebenezer Saunders seconded the amendment, because the spot in question was one which urgently needed the application of the Act. Mr. Lloyd, Mr. Runtz, and others, spoke of the difficulties in carrying out the Act, which, Mr. Runtz said, was really a Towns Improvement Act. The Board was about to clear several unhealthy areas under the Act, but they saw no prospect of any improved dwellings being erected, so that the people displaced had to seek accommodation elsewhere, resulting in the further overcrowding of other areas already sufficiently unhealthy. The amendment was lost, on a division, by 23 to 10.

Bye-Laws under the New Building Act.—The Building Act Committee submitted a code of bye-laws under the 16th section of the Metropolis Management and Building Acts Amendment Act, 1878, with respect to the foundations and sites of buildings, and other matters; and recommended that the said bye-laws be approved by the Board and referred back to the Committee with authority to send them to the Royal Institute of British Architects and the Institution of Surveyors in order to ascertain the views of those bodies with respect to such bye-laws before they are advertised and sent for confirmation to one of her Majesty's Principal Secretaries of State, as required by the Act. The recommendation was adopted.

FEARFUL PANIC IN A LIVERPOOL THEATRE.

The most terrible disaster of the kind which has ever taken place in Liverpool occurred on Friday evening in last week at the Colosseum Theatre, Liverpool. It appears that the theatre, which is now used as a music-hall, was filled with about 4,000 people, when, during the singing of a comic song, a disturbance occurred in the pit, and while this was going on, some person unknown, with or without malicious intent, raised the terrible cry of "Fire!" As a matter of fact there was no fire, nor the slightest sign of it, but, as in so many previous cases, the audience (which in this instance mainly consisted of young men and lads) instantly became panic-stricken, and the usual mad rush was made to the main entrance, in spite of the manager's assurance that there was no cause for alarm. Although there are no fewer than six available exits, they seem to have been nearly all either fastened or so hung as not to open outwards,—which in the case of a rush towards them from the inside when they are closed, would render them as useless as they would be if locked and bolted. It is not surprising, therefore, to read that everybody seems to have rushed to the main-entrance leading into Paradise-street. At the point where this entrance breaks up into passages and staircases there is a sort of well, and it was here that the crush took place. The converging streams of people surged together into a struggling heap, body falling upon body until the space was filled with a suffocating mass of human beings. A door-post which blocked in the dead and dying victims, was cut away by a police-officer, and the work of extrication commenced, and in a few moments no fewer than thirty-seven dead, and large numbers of

injured, had been carried out into the street. The majority of the victims are young and unmarried men.

The coroner's inquest has been opened, and no doubt full inquiry will be made into the alleged fastening of the doors,—a practice which the sad testimony of bygone catastrophes of the kind has shown to be fraught with the utmost danger. In this particular case the danger was doubly great, for the theatre, which is mostly frequented by the lower orders, was one of those in which there are two "performances" and two "houses" or audiences nightly. The first performance was nearly concluded when the panic arose. The building was bounded on one side by Whitechapel, on another side by School-lane, and at the back by Manisty-lane. On the ground floor there were the arena and pit, and on the second floor a balcony, above which was an upper gallery. There were two entrances in Whitechapel, only one of which was extensively used, and a door in School-lane, and one in Manisty-lane. The building itself has had a very chequered career. Thirty years ago it was a Unitarian Chapel. Afterwards it was transformed into a theatre. It continued as a theatre for some time, but, falling into disrepute, the dramatic licence was last year withheld by the magistrates.

In October, 1877, the Liverpool Borough Engineer (Mr. Deacon) made a report to the Health Committee on the means of egress at the Colosseum, when the lessee unsuccessfully applied for a renewal of his theatre-licence. Had the magistrates seen fit to renew the licence, they would probably have made it a condition that the alterations suggested by Mr. Deacon should be carried out. The lessee was left to carry on the building as a music-hall, and, thanks to division of authority, could please himself as to whether he adopted Mr. Deacon's suggestions or not. Whether he acted upon them is not stated, but it will probably be made clear at the inquest. Mr. Deacon's suggestions for improving the means of egress were thus summarised by himself at the end of his report:—

"1. To make the exit-door from the pit into School-lane open outwards.
2. To lock the gates of the gallery entrance to the walls when they are open.
3. To keep the outer door of the pit-entrance in School-lane open and locked to the wall during the performance.
4. To keep all the doorways of the three occasional exits from the pit ready for instant use as exits when the second audience is admitted, or to make them available at all times by admitting no part of the second audience before the whole of the first audience has passed out.
6. To fasten back by a lock the stage-entrance door in School-lane, and to restore the doorway from the pit which formerly communicated with the stage entrance.
7. To fix a proper handrail on each side of the gallery stairs.
8. To remove the pay-box to the side of the staircase.
9. To make the inner door of the additional staircase from the gallery open outwards in halves; to make the outer door of the same staircase open outwards, and to fix another handrail on the stairs.
10. To station a door-keeper wherever the doors are not kept securely open, and to use simple bolts for fastening the doors when shut."

PIANOFORTE DESIGN.

Our remarks recently on the artistic improvement of the pianoforte have brought us, among other communications, some lithographs of designs for pianoforte-cases by Mr. Percival, the superintendent of the cabinet-making department in Mr. Whiteley's well-known establishment at Bayswater, the merit of which, in comparison with the ordinary run of pianoforte cases, we willingly admit, though they do not touch what we regarded as the initial mistake, that of making the upright piano to imitate a cabinet, and ignoring the harp shape, which is the characteristic of the instrument, as shown in the harpsichord and spinet, and retained in the grand pianoforte of modern days. Still, there is the evidence in these that a better and more solid-looking form of design than we generally see can be made as a commercial success, so that we again ask why the great pianoforte-makers do not even attempt to do as well, or better.

SURVEYORSHIP ITEMS.

Bournemouth.—Mr. G. R. Andrews has been appointed surveyor to the Bournemouth Improvement Commissioners and Urban Sanitary Authority.

Smethwick.—Mr. J. C. Stuart, of Birmingham, has been appointed surveyor to the Smethwick Local Board and Urban Sanitary Authority.

THE PAVING OF LONDON BRIDGE.

Notwithstanding the arrangements made for the relief of the traffic by other routes during the paving of London Bridge, the bridge has presented a dead-lock at intervals during every day since its partial closing for traffic, many of those in charge of carts, vans, omnibuses, lorries, and other vehicles, preferring the delays and constant stoppages in crossing London Bridge by the single line on either side to and from the City, rather than face the steep gradients at Southwark Bridge. The result is that since the bridge was partially closed, the average time occupied by conveyances in effecting the passage from one side of the bridge to the other has been not less than half an hour. Nothing more than a walking-pace is possible, whilst blocks and actual stoppages on the bridge for several minutes at a time are frequent. One day during the present week there were three lines of conveyances between King William-street and the bridge approach blocking the thoroughfare for several minutes, unable to move, and this occurs almost daily. The two sides of the roadway over the bridge have been completed, and the paving of the central portion is now going forward. It is not expected that the works will be finished, and the bridge re-opened for traffic, before the end of the month.

NEW CATHEDRAL AT TUAM.

The new Protestant Cathedral of St. Mary, Tuam, was consecrated on the 9th inst., by the Right Rev. Dr. Bernard, bishop of the united dioceses of Tuam, Killala, and Achonry. The building of the cathedral has occupied sixteen years, and was originated, sustained, and completed by the zeal and energy of the dean, the Very Rev. Charles Seymour. The design was by Sir Thomas Deane. The style is Gothic. The cost up to the present has been 15,000*l*. The choir is seated in the chancel, as in St. Patrick's Cathedral. The seats of the prebendaries are faced, not with continuous desks, but with separate marble pillars that serve as lecterns,—an arrangement suggested and presented by the bishop. The pulpit and bishop's throne are of marble, carved. The pulpit was presented by the Rev. Mr. Phair, the throne by Mr. Nanny, the font by the Hon. Mrs. Bernard, and the lectern by Mr. Waithman. The great feature of the chancel is the ancient arch, which Mr. Keane pronounces to be a noble specimen of "Cuthite architecture." There is neither rood-screen nor reredos. The Communion-table stands out apart from the east wall.

RECORDS OF RESTORATIONS.

ARCHITECTURAL SOCIETY OF THE ARCHDEACONRIES OF NORTHAMPTON AND OAKHAM.

The thirty-third annual meeting of this society was held at Northampton on the 9th inst., the Rev. W. Thornton in the chair. The annual report, read by the Rev. N. F. Lightfoot, refers to faults in some of the plans submitted to the Society for alterations and "improvements" in churches, and says that such faults arise from the fact that,—

"Some persons will, for financial or personal reasons, undertake to direct matters in which they have no experience, rather than put themselves into the hands and under the guidance of those who have really made a careful study of architecture and of its several details. This is so frequently the case, that it is no wonder that an outcry has arisen against restorations, and that many an archæologist now hails an unrestored, unchanged church with the same satisfaction as that with which the few restored churches were commonly regarded some forty years ago. More than one instance presented itself to the minds of the committee where very considerable outlay has of late years been made (in the interior of churches especially), in which every change had been for the worse; inartistic roofs substituted for those of far greater beauty, all proprieties of arrangement set at nought, and every old landmark which had no apparent present use swept ruthlessly away. The Committee think that no local authority should have the power of doing just what it likes with the ancient monuments of a county because it may be able to provide the cost of making old things new; but that practically, as well as theoretically, the ecclesiastical authority of the diocese should interpose its veto to unnecessary changes, and should institute a more searching inquiry into the why and the wherefore, before issuing its faculty to do this or that. If a diocesan court had adopted the same practice before issuing a faculty, as the Church Building Society observes before making a money grant, requiring that every plan should be examined by a competent body of experts, there would not be so many complaints as are now rife against church restorations. As it is, complaints are often made, not without reason; yet when one wanders now and then into some distant corner of the land, where restoration is but little known, and sees good angel figures falling from the roofs because there is no desire to arrest the hand of decay, stained glass falling from the windows for want of a little lead, and *hoc genus omne* of neglect, one must confess that there are other evils to be deplored besides that of over-restoration."

The report having been adopted, and the officers of the society re-elected, the Rev. R. S. Baker read a paper on "The Excavations at Irchester Camp"; after which

Sir Henry Dryden read a paper entitled "Records of Restorations." The Society (said Sir Henry) has three functions with regard to old churches:—1. To advocate such repairs and fittings as will make them suited for the service of the Church of England. 2. To advocate such repairs and restorations as will not obscure, but rather elucidate, the history of the particular church, and the history of the art of architecture, and therefore to attempt to guide proposing restorers, and to prevent mutilation and deception. 3. To keep record of such changes and repairs as are made in the structures and fittings of the old churches. It has a function with regard to new churches,—to give opinion on the proposed plans, when asked to do so. The Society has all along paid attention to general archæology. The study of most sciences depends on examples for its great facts, hence it is of great importance that the examples should be trustworthy. Old buildings can be at once divided into those which are not used, and those which are used. The first class is comparatively small in number, and for the most part free from the hands of restorers. The second class is large, and spread over the kingdom. Great was the neglect and wretched the taste of the eighteenth century, but there cannot be a doubt that more harm has been done to British architecture in the last fifty years than in all previous time. The more church feeling has urged men to repair, and the more learned the architects have become when they and their *employés* were not also antiquaries, the greater and more numerous the mutilations and deceptions have become. . . . . There are three ways of looking at old buildings which are used,—the utilitarian view, the architectural or archæological view, and the picturesque view. . . . . In general, the clergy join the utilitarian view to the picturesque view, and ignore the archæological view. . . . . There is no duplicate of an old church or of old woodwork. Restored churches are often rendered valueless as examples. Many difficulties present themselves. We have to guard against mutilation and deception. It is better to say nothing than to tell a lie. He adverted to forms of difficulties. "As we can do but little to check these alterations and changes we should endeavour to keep records with scale drawings when they can be obtained." He quoted part of the address of the president of the meeting of the Archæological Institute at Northampton on this subject, and said he quite agreed with that address, and recommended its perusal to the Society, and that we had better act according to the probable circumstances. In church fittings we must be in part practical. All chairs, tables, stools, &c., do not fit all persons equally well,—they are compromises. There are two matters which have to rule church pewing,—are men to take hats to church, and are congregations to kneel? . . . . There are three positions of the body which go for kneeling in England,—a fourth position is often used abroad. The clergy mostly acquiesce in the second position, which the lecturer called "squatting." There were three advantages in long kneeling-stools over hassocks. He then described the state previous to repairs and alterations, and the repairs and alterations made in five churches near his own residence,—Adston, Moreton, Eydon, Woodford, and Byfield.

The City of London School.—At a recent meeting of the Court of Common Council, a report was submitted by the City of London School Committee relating to the removal of the school, and recommending that one acre and a half at the eastern end of the Victoria Embankment be granted as a site for the new buildings for the City of London School; that the necessary steps be taken forthwith to obtain the sanction of Parliament; and that it be referred back to the committee to obtain such detailed designs, drawings, plans, and estimates as they may think necessary, and to consider the best mode of utilising the present site in Honey-lane-Market, Milk-street, by sale or otherwise, reporting thereon to the Court. It was agreed that the report should be printed and circulated, and the consideration thereof adjourned.

BUILDERS' BENEVOLENT INSTITUTION.

The thirty-first anniversary dinner of this Institution is fixed for Thursday, the 7th proximo, Mr. Edward Conder, president, in the chair. Note should be taken of the change of *venue* from Willis's Rooms, St. James's, to the Freemasons' Tavern, Great Queen-street. We hope the anniversary will be signalised by a list of subscriptions commensurate with the deserts of the Institution, which has recently increased the amounts of its pensions, and has in other ways extended its work of benevolence.

THE THAMES CONSERVANCY AND THE LONDON SEWAGE.

At the meeting of the Metropolitan Board of Works on the 11th inst., the clerk, Mr. J. E. Wakefield, read the following letter from the Thames Conservancy:—

"Thames Conservancy, 41, Trinity-square, E.C.,
October 8, 1878.

Sir,—I am directed by the Conservators of the River Thames to state that, on receipt of your letter of the 28th of May last, they referred the joint reports enclosed therewith, respecting the condition of the River Thames, by Sir Joseph Bazalgette, and Messrs. Lee and Chatterton, and by Mr. Keates, and Dr. Du Pré, to Captain Calver, and to Captain Burstal, secretary, and to Mr. Leach, engineer of this Board, and I am now to forward, for the consideration of the Metropolitan Board of Works, copies of the following documents:—

1. Captain Calver's rejoinder to the joint reports made to the Metropolitan Board of Works by the above-named gentlemen respecting the sewage outfalls at Barking and Crossness.—September 6th, 1878.

2. Observations by Captain Burstal, R.N., on the report of Sir Joseph Bazalgette, and Messrs. Lee and Chatterton.—September 5th, 1878.

3. Remarks by Mr. Leach, Engineer to the Conservancy Board, on the same report.—August 31st, 1878.

A careful consideration of all the documents bearing upon this question has only confirmed the Conservators in the opinion expressed in the letter addressed to you on the 6th of December, 1877, when forwarding Captain Calver's report.

It was there stated that the conclusions arrived at by Captain Calver are correct, and that the Metropolitan Board of Works should without delay carry out the provisions of Section 20 of the Conservancy Act of 1870, by removing such banks and obstructions as have arisen from the flow of sewage at the outfalls.

If the Metropolitan Board of Works still maintain their non-liability to dredge away the deposits complained of, or if they agree with Sir Joseph Bazalgette as to the origin of these deposits, it would then become evident that a difference of opinion, such as that contemplated by Section 24 of the Conservancy Act of 1870, has arisen between the two Boards.

The public welfare is so greatly concerned in maintaining the clear navigation of the Thames and the purity of its water, that the Conservators trust the Metropolitan Board of Works will modify their views of this important question, and not only cause the existing deposits to be dredged away, but also adopt such measures as will prevent the formation of any deposits for the future.

I am, &c., E. Burstal, Secretary.

J. E. Wakefield, esq., Metropolitan
Board of Works."

Mr. Roche moved that the communication (together with one from the Town Clerk of the City of London) be referred to the Works and General Purposes Committee, and that the following letter be addressed to Capt. Burstal:—

"I am desired by the Metropolitan Board of Works to acknowledge your letter of the 8th inst., enclosing copies of Captain Calver's rejoinder to the joint report, and the observations and remarks thereon, and to inform you that the same has been referred to the Works and General Purposes Committee for consideration and report. You proceed to state that a careful consideration of all the documents bearing upon this question has only confirmed the Conservators in the opinion expressed in your letter of the 6th of December, 1877, to the effect that the conclusions arrived at by Captain Calver are correct, and that the Metropolitan Board of Works should without delay carry out the provisions of section 20 of the Conservancy Act of 1870 by removing such banks and obstructions as have risen from the flow of sewage at the outfalls. The Metropolitan Board are not aware of the existence of any banks or obstructions which have arisen from the flow of sewage at the outfalls, and they desire me to request that you will furnish them with a plan and section on a sufficient scale showing the position, configuration, and extent of the banks and obstructions which you allege to have been so caused, and which you now formally require the Board to remove by dredging. I shall feel obliged if you will supply me, for the use of the members of the Board, with sixty or seventy prints of the above reports."

Mr. Runtz seconded.

Mr. Leslie moved as an amendment that the letter should be confined strictly to asking for additional copies of these reports, and for a plan showing where the alleged shoals existed.

Mr. C. Legg seconded the amendment; and in the course of the discussion which ensued,

Mr. Fowler expressed the hope that nothing would be done which would have the effect of shelving this question, for a very decided opinion prevailed among the public that something should be done with regard to the discharge of sewage into the river.

Mr. Richardson remarked that this communication from the Thames Conservancy had nothing to do with the state of the water in the river. The question was whether the sewage discharged from the Board's outfalls did leave such deposits at the bottom of the river as to result in the formation of these shoals.

Mr. Selway supported the motion, and thought it the simplest thing in the world to ask the Thames Conservancy exactly what they wanted the Board to do.

Mr. Jackson (of Woolwich) had no hesitation in saying that the shoals at the outfalls both at Crossness and Barking were caused by the sewage, and if they applied to the Thames Conservancy as suggested he believed they would be most happy to point out where these obstructions were to be found. It appeared to him that the Board must do one of two things. They must either filter the sewage before it entered the river, or remove the outfalls lower down the river.

After some remarks from Mr. Cook and other members, the amendment was negatived, and the original motion was carried by a large majority.

CONGRESS OF THE SANITARY INSTITUTE.

Sir,—Permit me, in reply to the article on the above subject in your issue of the 21st ult., to assure you that nothing can be further from the mark than the idea that the Sanitary Institute is intended to interfere with the Health Section of the Social Science Association. The Institute, being an independent body doing regular sanitary work in London, and having at all times under its consideration some sanitary detail or advancement, has no help for it but to hold one or two general meetings in the course of the year. That is essential to its usefulness and work, and the occurrence of its time of meeting near to that of the Social Science Association is simply an accident, for which it is not responsible, inasmuch as the time of meeting was fixed long before the meeting of the Social Science Association for the present year was announced. It is equally unfair to accuse the Sanitary Institute of pillage of the Sanitary Exhibition; in fact, the Social Science Association had itself dropped its exhibitions; and if the Sanitary Institute had not taken up the matter as it did, these useful competitions would have entirely closed.

In the great work of advancement there is room for our Institute as well as for the Health Department of the Social Science Association; and if the Institute supplants that Section of the Association, it is because the subject is more completely in hand in an independent society than in a mere section of an Association so comprehensive in its objects as the National Association for the Promotion of Social Science. Lory Marsh, Registrar.

*** We must leave the public to form their own opinion as to how far the Sanitary Institute attempted at its formation to supplant and make stock out of the Health Department of the Social Science Association. Although several prominent members of the latter were induced to belong to the Institute at first, the *modus operandi* of the Institute has served to convince many that it is a mistake to increase the number of societies for one particular object. It is not correct (Dr. Marsh is probably misinformed) that the Association has relinquished the idea of a Sanitary Exhibition in connexion with their Congresses; indeed, arrangements for an exhibition in connexion with the forthcoming Cheltenham Congress were for some time under consideration.

Knockers for Liverpool Town-hall Door. During the meeting of the Liverpool Town Council, on the 2nd inst., a heavy door-knocker was placed upon one of the tables for the inspection of the members. It was cast in bronze, and apparently represented a figure of Neptune standing upon two sea-horses. The presence of the article was explained by the following communication addressed to the Mayor by Mr. P. H. Rathbone:—

"During your mayoralty the Town-hall doors have been so hospitably and persistently open, that I have hesitated to offer you so apparently useless a gift as a pair of knockers. But, having met at Venice with a pair of knockers, belonging to one of the old palaces, and which a competent judge,—the Rev. Greville Chester,—informs me are the finest pair he has seen, and which, Mr. Leighton tells me, are becoming yearly very scarce and valuable, I do not feel justified in not making my native town the offer for the front doors of the Town Hall, especially as the design might have been specially adopted for that position."

The matter was referred to the Finance and Estate Committee.

WORCESTER GUILDHALL RESTORATION.

ALLEGED SHORT "QUANTITIES."

At a recent meeting of the Worcester Town Council, the following letter from the contractor for the restoration of the Guildhall was read:—

"15, Foregate-street, Worcester,
5th September, 1878.

Dear Sir,—I must request you to lay this letter before the Corporation of the city of Worcester, and give them the notice contained herein at their next meeting. I have, by an agreement dated 1st October, 1877, agreed with the Corporation to restore the Guildhall for the sum of 11,543*l.* 4s., but I was induced to enter into such contract by the statements made to me by the agent of the Corporation (to whom I applied in pursuance of their advertisement of May, 1877) as to the quantities required for the works. These statements I have lately discovered to be erroneous and much understated, and I am unable to complete the works at a price which I agreed to accept relying upon the accuracy of the quantities supplied by the agent of the Corporation. I must, therefore, request that a proper modification be made in the contract price, on account of the difference between the quantities of materials which will have to be used and those which were represented to me to be necessary for the works. If the Corporation will not accede to my request, I must beg to give them notice that I must stop the works and repudiate the contract entirely. I must request the favour of a reply to this letter in the course of fourteen days from this date, for otherwise I shall be very reluctantly compelled to stop the works at the end of that time, and to seek that remedy against the Corporation to which I may be entitled.—I remain, yours obediently, Thomas Dixon."

The Town Clerk stated that the letter had been laid before the Guildhall Restoration Committee, and they instructed him to reply to it, and he wrote to Mr. Dixon to the effect that the question of quantities was not mentioned in the contract. The advertisement for tenders for the work stated "quantities will be supplied," and they were supplied by Mr. Hawkes, of Birmingham.

Mr. Bozward moved that the matter be referred to the Guildhall Restoration Committee, and asked who endorsed the quantities.

The Town Clerk said he could not tell. He saw no necessity for Mr. Dixon stopping the works. He could complete the work, and then charge for what he had done.

Alderman Wood said that the same quantities had been handed to a certain number of builders, every one of whom put his price to them. He thought the great error was in the price put to the quantities, and not in their deficiency.

Alderman Jones observed that if there was an error in the quantities that was not the proper time to make the complaint, but at the completion of the work.

The motion was then carried.

At a subsequent meeting of the Council, it was, after some discussion, unanimously agreed that, in order to effect an amicable arrangement with Mr. Dixon, and to prevent a stoppage of the work of restoring the Guildhall, and without prejudice to the legal rights of the Corporation, the Council agree,—on Mr. Dixon continuing and completing the work of restoration of the Guildhall,—to pay him for all work done in excess of that provided for by the quantities prepared by Mr. Hawkes, subject to the allowance for any excess in the quantities as to any work or old materials, the prices to be ascertained according to the bills of quantities priced by Mr. Dixon for his tender, so far as applicable, and that the question of the amount to be paid or allowed in respect thereof be left to the decision of the architect, pursuant to the contract, Mr. Hawkes, and a surveyor appointed by Mr. Dixon, being at liberty to attend before the architect and support their respective views.

GLEANINGS FROM GLASGOW.

Proposed Building Regulations.—The Glasgow Association of House Factors have resolved to strenuously oppose the Provisional Order anent new building regulations becoming law, as they allege that if it were passed 30 per cent. of the property of Glasgow could not be rebuilt in the event of fire or other accidents destroying it. The Association consider that, in view of the proposed regulations, provision should be made for compensating proprietors and others, whose ground and security would be confiscated.

Disposal of Sewage.—A short time ago it was mentioned that a Bill was likely to be introduced into Parliament, having for its object the disposal of the sewage of Glasgow by some method which would keep it out of the Clyde. It is now stated that Mr. Bateman, C.E., is engaged drafting a Bill for this purpose. Mr. Bateman has put forward three alternative schemes. By the first, the sewage would be raised by pumping from the south to the north side, the whole to be taken to Dalmuir, at a cost

of 858,000*l*. The second proposes that the sewage on the north side should be taken to the south, and the whole conveyed to Shiels, in the parish of Govan, at an estimated expenditure of 716,000*l*. The third scheme suggests that the sewage on the north side should be taken to Dalmuir, while that on the south side should be taken to Shiels, the cost in this case being 867,000*l*. These sums do not include the price of land and interference with property, nor do they estimate the cost of dealing with the sewage at the outfall, which may be set down at from 40,000*l*. to 45,000*l*. per annum. The schemes are estimated on a future population of 1,350,000.

The University Hall.—At the Dean of Guild Court, on the 10th inst., plans were passed for the erection of the great hall of the University at Gilmorehill. It will be remembered that the Marquis of Bute some time ago contributed a sum of 40,000*l*. towards the erection of the hall, and so put the University authorities in a position to begin operations. The building, however, will cost considerably more than the sum stated. Sir James Watson (late Dean of Guild), hoped that in a building of that kind the greatest care would be exercised, both as to workmanship and materials. He did not want to say anything about what had been done, but he thought there might be some improvement in that respect.

Fine Art Galleries.—Plans prepared by Mr. Burnet for the proposed Fine Art Galleries in Sauchiehall-street were submitted to the Dean of Guild Court on the 10th inst., but they were not passed, Mr. White, master of works, pointing out that the front line of the building encroached a little on the street. A site has been procured on the south side of Sauchiehall-street, and the building is to have a frontage of 100 ft.

Proposed Industrial Exhibition.—The proposal to organise an industrial exhibition at Glasgow, as suggested by the Earl of Rosebery on the occasion of his recent visit to Glasgow, is being actively promoted. A proposal is stated to have been made by Mr. Cunliffe Owen, C.B., Secretary of the British Commission to the Paris Exhibition, that a special feature in the project should be a complete exhibition of iron and its varied products, and that this department at least should be international, embracing exhibits from America, France, Belgium, and Sweden. The Swedish Commission at the Paris Exhibition has intimated its willingness to send to Glasgow in 1880 the whole exhibits of the process and tests in the manufacture of Swedish iron. The proposal to connect a permanent museum and winter garden scheme with the exhibition has also met with warm support.

Painted Glass in the Merchants' House.—The large windows in the new hall of the Merchants' House, where the Dean of Guild holds his courts, have been filled with stained glass by Messrs. W. & J. J. Kier, of Glasgow. The subject of one of the compartments is "The Letter of Guildry." It represents the occasion, on the 6th of February, 1605, when Sir George Elphinstone, the provost of the burgh, sat in their hall in the old tolbooth, surrounded by the bailies and "great council," and there came before them the commissioners chosen by "the merchant rank," and those chosen by "the deacons and body of crafts," and presented the arrangement come to as expressed in the Letter of Guildry, and asked the magistrates to interpose their consent and authority to it. The other subject represents the first court held by the Dean of Guild. In the corridor of the Merchants' House there are six other windows, containing allegorical subjects filled up with conventional architectural designs in the Cinquecento style.

The Will of Mr. Benjamin Colls, late of 53, Moorgate-street, and of Sutton-common, who died on the 25th of August last at Bray, Wicklow, Ireland, was proved on the 3rd inst. by Mr. William Abraham Colls and Mr. John Howard Colls, the sons, the executors, the personal estate being sworn under 18,000*l*. The testator leaves to his wife, Mrs. Elizabeth Colls, such of his household goods and effects as she shall select, 100*l*., and 400*l*. per annum for life; to his niece, Elizabeth Richardson, and his friend, Jemima Davis, 100*l*. each; to his sister, Mrs. Martha Shaw, an annuity of 50*l*. for life; and the residue of his real and personal estate to his said two sons.—*City Press.*

NEW THEATRES.

Worcester.—The Theatre Royal, Worcester, opens on Monday next, having been rebuilt, with the exception of the greater part of the main walls, after destruction by fire. Increased means of entrance and exit have been provided. The sun-burner has been provided and fixed by Messrs. Strode & Sons. The proscenium, ceiling, &c., have been elaborately decorated by Mr. E. Bell, of London. The architect is Mr. C. J. Phipps; Messrs. Wood & Sons, of Worcester, were the contractors; Mr. Greenway, Worcester, supplied gas-fittings; and Mr. R. Jefferies, of London, has acted as clerk of the works.

London.—On the 2nd inst., Mr. Locock Webb, Q.C., and Mr. Young, moved before Mr. Justice Hawkins, sitting as Vacation Judge, on behalf of the "Alcazar," Limited, for an injunction to restrain Mr. John Baum, late of Cremorne Gardens, from applying to the magisterial authorities for a licence to use the Holborn Amphitheatre for musical and other entertainments under the name of The Alcazar. The plaintiff company was recently incorporated with a capital of 100,000*l*. for the purpose of purchasing Savile House, Leicester-square, and other property, and building there an immense theatre and Parisian *café*, of the character of the well-known Paris Alcazar, the name of which the company has adopted. On the 6th ult. the company's prospectus was registered at Stationers' Hall, under the name of the "Alcazar." The company alleged that the defendant was about to use that name for his place of entertainment, and that they had already acquired a property in that name. An interim injunction was granted, and on the hearing of the motion, on the 12th inst., Mr. Justice Manisty held that Mr. Baum had an inchoate right to the title of which nobody by the forming a company could deprive him, and dismissed the motion with costs.

BUILDINGS FOR POOR-LAW ADMINISTRATION.

Birmingham.—The foundation-stone of the schools and cottage homes which are being erected by the Birmingham Board of Guardians at Marston Green was laid on the 8th inst. About twenty acres of land have been obtained, at a cost of 140*l*. an acre, and it is intended to erect schools, workshops, cottage homes, an infirmary, and a head master's residence. There will be three schools, one for boys, one for girls, and another for infants. In the workshops instructions will be given in shoemaking, painting, carpentry, baking, &c. There will be fourteen "homes," each of which will accommodate thirty children. Each home will be presided over by a man and his wife, who will be styled the "father" and "mother." The homes will consist of a dining and play room for the children, and a sitting-room for the "father and mother," together with a kitchen and scullery, and dormitories. Each home will be constructed in the form of a Maltese cross, and every room is of the same dimensions, viz., 16 ft. by 20 ft. The washing in connexion with each home will be undertaken by the children,—boys or girls, as the case may be,—composing the "family." The infirmary will contain four wards. It is estimated that the buildings will be completed in about fourteen months, and that the total cost will be 20,000*l*. Mr. W. N. Homeyard, of Birmingham, is the architect; and Mr. W. Robinson, of Birmingham and Worcester, is the contractor. As will be gathered from the foregoing particulars (for which we are indebted to the *Birmingham Gazette*), the Birmingham Poor-Law Guardians are about to initiate an important experiment in the education of pauper children,—an experiment which, we hope with Mr. Muntz, will be productive of large results in the depauperisation of pauperism.

Clayton.—The new infirmary erected in connexion with the North Bierley Union Workhouse at Clayton has been completed. It occupies a position detached from the main building, having its principal frontage to the east, but being equally open to the west. The wards occupy the entire breadth of the building, and have windows on each side. The length of the new building is about 240 ft., and the interior width of the wards 25 ft. The accommodation provided is estimated at seventy-two beds. The style adopted in the exterior is Italian. The plans were prepared by, and the works have been constructed under the superintendence of, Mr. John Drake, architect, Queensbury, the following having been the contractors, viz.,—Messrs. Balmforth & Reece, masons; John Patchett, joiner; Abraham Hill, slater; J. S. Stead, plasterer; Henry Crowther, plumber; E. & B. Briggs, painters. The entire cost has been about 9,000*l*.

OBITUARY.

Mr. John Walker, Builder.—The death is announced of Mr. John Walker, one of "the pilgrim fathers" of Birkenhead, and the builder of nearly all the principal streets, including Hamilton-square, in "the City of the Future." He was a member of the first board of Birkenhead Commissioners in 1833, and held that position for twenty years; after which he retired from business, and has since devoted himself to farming at Storeton, near Bebington, where he died on the 12th inst., in the eighty-sixth year of his age, having been born at Carphin, in Fife, in 1792.

Mr. H. Gandy Cole, C.E.—We mentioned last week (p. 1077) the accident at the Moorswater Viaduct, on the Cornwall Railway, by which the engineer, Mr. Gandy Cole, lost his life. "Cornubian," in the *Cornish Telegraph*, gives some particulars of Mr. Cole and his brief career. Although he had not yet reached his twenty-fifth year, he was, after having designed and superintended the building of a stone viaduct near Bodmin-road, called upon to design the greater work across the valley at Moorswater. When tenders were invited, the lowest exceeded his estimate by several thousand pounds. The result was that the Great Western directors resolved to build it themselves, giving Mr. Cole entire charge of the work, not only because they believed in his estimate, but in order to insure thoroughness in the work. Only a few days before his death he spoke proudly of it as the largest stone viaduct in the country, being 130 ft. high, with eight arches of 80 ft. span; and told how the crane, by which he afterwards met with his death, was so nicely constructed and controlled.

ENCLOSURE OF ANTIQUITIES.

Dunse.—A few years ago (says the *Kelso Chronicle*) attention was called to the propriety of enclosing and preserving the "Covenanters' Stone," an interesting relic of the encampment on Dunse Law of the great army of Covenanters, numbering somewhere about 30,000, under the command of General Leslie, in June, 1639, as numerous and frequent visitors had adopted the practice of chipping off and carrying away pieces as mementoes of their visits, until the stone was under the level of the surrounding turf, and which had nearly closed over it. It has now been enclosed, the surrounding turf which had recently covered it has been pared away, and its surface again presents the same form that it did when it stood about 2 ft. 6 in. above the ground. Its original form was oblong, measuring nearly 5 ft. by 2 ft. 6 in. The stone itself is an obtruding piece of the old red sandstone, highly metamorphosed through the action of heat, resting upon the subjacent trap or greenstone, of which the hill, as well as some of the surrounding hill, are composed.

Roman Camp at the Lawe, near South Shields. At a recent meeting of the South Shields Town Council, upon the proposition to expend 425*l*. upon enclosing the site of the Roman Camp at the Lawe, Mr. Shotton moved that it be struck out. He was quite astonished that any person should propose the expenditure of such a sum in connexion with a few old stones. He hoped he would never again hear of the Roman remains in that Council. Mr. Wardle seconded the proposition. Ald. Williamson hoped they would not for 425*l*. allow South Shields to sever its connexion with ancient Rome. The Ecclesiastical Commissioners had behaved in a most liberal manner to the town, and the Council ought not to allow anything to be done to slight their offer. Mr. Bowman suggested that the matter be done by subscription, and presented to the town. The motion was afterwards lost, and an amendment (to allow the vote) was carried.

TO CLEAN LEAD.

Sir,—Will some of your correspondents tell me what is the best way to clean leaden milk-pans? My dairywoman has used salt, which seems to bring off a blackness.

Beta.

THE OBELISK.

Sir,—Is it not rather unsatisfactory, if not alarming, to hear of Sir Joseph Bazalgette reporting that our granite obelisk is already decaying from the effect of the gases of the London atmosphere, when he has but recently completed the costly Thames Embankment in that material? Egyptian Syenite obelisks have hitherto been considered the most durable monuments the world has produced. May we not, then, ask, in some alarm,—Is the Embankment decaying, and does Sir Joseph confess to having made a mistake in using this material in its construction?

We must all hope that there is some mistake in the evidence on which the report has been made.

May not the effects observable upon the obelisk be due to the salts of sea-water absorbed during its voyage to this country, or when lying exposed on the Thames? The Egyptians were well aware of the effect of salt on granite, and consequently never used it underground. Experience of the durability of granite in London is both ample and conclusive. London Bridge, the York Column, the Crimean monument in Westminster, the Nelson Column, and numerous other granite structures, varying in age from nearly one hundred to twenty years, are in perfect condition. No person ever heard of the proposal to apply chemical nostrums to their surfaces. Many of our decaying stone buildings have been so treated, but, unfortunately, with no good result. Under these circumstances it is very satisfactory to hear that the report is referred back for further inquiry and information. There is a national interest in the obelisk, and, therefore, before the "stone solution" is applied, it would be satisfactory to be informed *where* it has been used, upon what material, and *when*, inasmuch as time is an important element in the test.

I think I have read that the Egyptian obelisks were burnished, and it is, perhaps, partly to this that their durability is due.

If so, should not this have been done before ours was elevated? The cost is about 2s. 6d. per foot super.

Henry Travis.

SANITARY SHORTCOMINGS.

Newlyn.—A correspondent of a West of England paper calls attention to the insanitary condition of Newlyn, which, with its 3,000 inhabitants, has, he says, "absolutely no system of drainage. Open drains and dirt-heaps abound, and the result is that fever has become endemic in our midst. . . . The Medical Officer of Health has presented a very strong report to the Sanitary Authorities. All they do is to send round an old man with a cart, who skims the top of the dung-heaps, and leaves the rest to decompose in the sun, and pretty much the same operation is performed upon the open drains. A few years ago (four or five) an officer from the Sanitary Department of the Privy Council inspected the village, and reported very strongly on the subject; but all to no purpose. The persons who ought to move in the matter are silent, for fear of giving offence."

Leith.—At a meeting of the Edinburgh and District Water Trust on the 10th inst., the Clerk read a letter from the Town Clerk of Leith, dated the 2nd inst., complaining of scarcity of water in Leith. Mr. Coyne explained that all the water which the pipe could possibly carry to Leith was being sent, and that there was always a deficiency of supply in some localities there owing to the cisterns being wretchedly small. Mr. Garland said there was a general scarcity of water in Leith,—in fact, the streets where it was felt were too numerous to mention. Amid some laughter he exhibited a centipede which had been drawn off with some water on the previous night by the Medical Officer, and said that perhaps some girl might have drunk that and lost her life in consequence. If a constant supply of water were kept on, it might prevent these nasty reptiles, as he might call them, being sent into their tanks. On the suggestion of the Lord Provost, the matter was remitted to the Works Committee to inquire, and with powers to provide an additional supply if necessary.

Musselburgh.—At the close of the Court held on the 9th inst. at Musselburgh for the registration of voters, Sheriff Davidson, who presided, asked,—"Who looks after the sanitary matters of the town?" Mr. Macfarlane (Town Clerk.)—"The Local Authority, which the Town Council constitutes." The Sheriff.—"Have they any officer?" Mr. Macfarlane.—"They have a sanitary inspector, Mr. Turnbull." The Sheriff.—"He had better be set to do his business. I never saw a dirtier place in my life,—from Newbigging townwards." Mr. Turnbull subsequently waited upon the Sheriff and explained to his lordship that the sanitary condition of the district in question was due to the fact that residents there, as elsewhere in the town, had nowhere to empty filth except in the gutters in front of the houses. The gutters, it was further stated, were swept thrice daily.

ARBITRATIONS.

Ryde.—On the 10th inst. Mr. J. Soames, Under Sheriff, opened a court in the Town-hall, Ryde, I.W., for the purpose of arbitrating in a dispute between Mr. R. C. Spencer, of Ryde, and the London, Brighton, and South-Coast, and South-Western Railway Companies, respecting the value of two houses in Melville-street, called Nos. 1 and 2, Chester House, which the companies require for the purpose of carrying out their new works. A jury having been sworn, proceeded to view the premises. The evidence was long and conflicting, Messrs. F. Newman, T. Dashwood, and J. Binfield Bird, and Mr. W. H. Wallis, giving various estimates of the value of the houses, the general average being 2,456*l.* Mr. Virgoe Buckland, surveyor, Mr. Stephenson, of the firm of Hunt, Stephenson, & Co., Mr. R. C. Driver, Whitehall, and Mr. Thomas Hellyer, architect, of Ryde, all gave much lower estimates, averaging 1,498*l.* The jury gave a verdict for 2,000*l.*, the railway companies to pay costs.

Shoreham.—At a meeting of the Shoreham Harbour Trustees, on the 8th inst., the clerk read the award of M. A. Easton, the arbitrator in the matter in dispute between the trustees and the late contractors, which ordered the trustees to pay 8,755*l.* 11s. 9d. of the amount claimed, 9,145*l.* 3s. 3d., together with 95*l.* 14s. 4d., being half the costs of the award.

ACCIDENTS.

Landslip at Huyton.—An inquest was held on Monday last at Huyton, Cheshire, on the bodies of Michael Kelly, aged twenty-one, and Thomas Dunne, twenty-eight, who were killed in a recent landslip at some sewerage works in progress near Sandy-lane, Huyton, at which also, three others were injured. It appeared from the evidence that 30 ft. in length of the trench had fallen in, and that no shores were used. Mr. G. Rayner, of Bootle, contractor for the sewerage works, was called, and deposed that the cutting which fell in was commenced on the previous Tuesday. He had no reason to believe that timber ought to have been used for shoring up the sides of the trench where the fall took place. There was first about 1 ft. 6 in. of sand, under which was a bed of shale about 10 ft. in depth, and after that the solid rock commenced. After deliberating together for some time, the jury returned a verdict that the deceased had come to their deaths by the accidental fall of earth.

Fall of a Steam Lift.—On the 10th inst., one of the steam lifts used by Messrs. Cook, Son, & Co., of St. Paul's Churchyard, for the conveyance of persons and goods to the respective floors of the warehouse, fell with a loud crash. It appeared that some part of the engine by which it was worked suddenly broke, and the lift being at the top of the building, a height of about 60 ft., was precipitated with its contents to the bottom. A boy who was driving it at the time was so much hurt that he died almost immediately. A woman named Green had both legs broken.

Slung Platform Scaffolds.—An inquest was held at Woolwich on the 12th inst., on the body of James Richards, aged 39, employed as a driller at the pier extension works at Beckton Gas Works, North Woolwich. The evidence showed that, on the previous Thursday deceased was working upon a scaffold 30 ft. above the river, drilling a hole in an iron girder. He was suddenly missed by a companion, who, looking down, saw only a man's hands above the water, and a couple of short planks upon which deceased had been standing were floating away. It was surmised that the planks, which formed part of a sling-platform, had slipped from a ledge upon which they had been resting, and that the deceased fell feet foremost, and stuck in the mud, the tide being low. An attempt was made to rescue him, but some time was occupied in getting a boat, and the deceased had then disappeared. A model of the scaffold was produced at the inquest, and it was stated that every precaution was taken; but the coroner and jury were of opinion that the slung platform was a cheap and careless contrivance, which might have been made quite secure with a little trouble. Verdict: "Accidental death."

MASTERS AND MEN.

Birmingham.—On the 11th inst. the sheet-glass makers concerned in the dispute at Messrs. Chance's glassworks, Spon-lane, had a meeting, and resolved to strike. They afterwards had an interview with the masters, to whom they communicated this fact, and the masters, on the other hand, said they were determined to close the works. Under these circumstances, about 750 people will be thrown out of employment. It is expected that the men will come out on strike this Saturday, October 19th.

Edinburgh.—At a numerously-attended meeting of master joiners, Mr. John Smith in the chair, it was unanimously agreed that owing to the present stagnant state of the trade, immediate intimation should be given to the operatives that, on and after Friday, October 18th, a reduction of ½d. per hour will be made on the present rate of wages, making the rate in future 7½d. per hour for competent workmen.——It is stated that one of the largest employers of labour in the Edinburgh building trade has given notice of a reduction of 1d. per hour on the standard rate of wages at present paid to operative masons, a corresponding reduction being at the same time intimated on the wages of the labourers. Six months ago the operative masons submitted to a reduction of wages from 9d. to 8d. per hour, so that the one now in question will bring the rate of payment down to 7d. per hour, while the wages of the labourers will be at the rate of 4½d. per hour.

Aberdeen.—The carpenters' strike continues. Representatives of the Operatives' Society are said to be watching every steamer arriving in Aberdeen that is likely to bring workmen from other quarters. One firm is stated to have engaged from forty to fifty men in Glasgow, and arranged that they should come through to Aberdeen by the train due there at 3·20 on Tuesday morning in last week. The men were met at Glasgow by persons understood to be in co-operation with the Aberdeen Trades' Society, and the result was that only fourteen reached Aberdeen.

Staffordshire Iron Trade.—Mr. Chamberlain, M.P., as president of the South Staffordshire Iron Trade Wages Board, has, as arbiter, decided that wages should be reduced 5 per cent., or 6d. per ton for puddling, the reduction to take effect from the 21st inst., the rate now settled to be subject to reconstruction by the Board at any time on one month's notice by either party.

ARCHITECTURE IN GERMANY.

A large number of German and foreign architects are expected to pay a visit to Berlin towards the end of October, when several events of interest are to come off. Among these is the public exhibition of the competing plans for the new Kaiser Wilhelm University of Strasburg. At the same time the general Fine-Art Exhibition, to which a variety of plans, designs, and objects of importance to architects have been contributed, will be opened. A third Exhibition of interest will be that of architectural monuments and other remains of ancient Greek art discovered in the wonderfully successful operations conducted under the auspices of German *savans*, and at the expense of the German Government, in Olympia. The Society of Architects of Berlin are already making preparations to render the visit of their brother professionals from a distance a pleasant one by securing them facilities for the inspection of public edifices and collections, as well as by entertaining them at a special festival in connexion with the first of the series of social reunions of the Society during the coming winter season.

Dean of Guild, Edinburgh.—At a meeting of the Council of the Edinburgh Guildry on the 10th instant, it was unanimously resolved to recommend for re-election Mr. John Smith as Dean of Guild for the ensuing year.

GLASGOW INSTITUTE OF ARCHITECTS.

The eleventh annual general meeting of the Glasgow Institute of Architects was held on Tuesday afternoon, in the offices of Mr. William Maclean, the secretary, at 196, St. Vincent-street, Mr. John Burnet in the chair.

It appeared from the report for the year, which was adopted, that the members numbered forty-nine, and that while two had been added to the roll, one had died. The laws of the Institute had, it was stated, recently been amended, "so as to mark still more decidedly the Institute's disapproval of architects having any pecuniary interest in any trade contract for their clients, except what they directly receive from such clients." It was thought that this rule was calculated to promote a higher standard of conduct in all professional relations. The gold medal for the encouragement of good draughtsmanship among the pupils and assistants of members had, it was reported, been gained by Mr. A. J. Russell, of the office of Mr. D. McNaughtan, for a drawing of Paisley Abbey; and a prize given by the president for the same purpose had been gained by Mr. J. Robertson, of the office of Mr. J. L. Cowan. It was mentioned that the Institute had sent Messrs. Honeyman and Douglas as a deputation to the Town Council to urge that a matured General Building Act was required in the public interest. The report, in conclusion, expressed the hope that a greater number than had yet joined the Institute would now identify themselves "with members of the profession who pledge themselves to resist the vicious system of double commissions and other temptations to partiality in the exercise of their onerous professional duties."

It was intimated by Mr. James Sellars, jun., the treasurer, that the funds were in a satisfactory condition.

The following gentlemen were then elected members of the council for the ensuing year, viz., Messrs. William Forrest Salmon, Alexander Petrie, J. L. Cowan, James Thomson, John Baird, John M'Leod, Matthew Forsyth, Campbell Douglas, John Honeyman, and R. A. Bryden.

The newly-elected council, at a meeting later in the day, chose the following office-bearers for the same period:—Mr. Campbell Douglas, president; Mr. James Thomson, vice-president; Mr. James Sellars, jun., treasurer; Mr. Wm. M'Lean, secretary; and Mr. John Burnet, auditor of professional accounts.

ARCHITECTURAL ASSOCIATION.

Syllabus of Papers.

1878.

October 25.—Opening *Conversazione*.
November 8.—Address from the President. Mr. H. L. Florence.
November 22.—Windows. Mr. Aston Webb.
December 6.—Organs and their Treatment. Mr. Somers Clarke, Jun.
December 20.—Discussion: Architect, or Architect and Surveyor. To be opened by Mr. A. Payne.
1879.
January 17.—
January 31.—Hotels and Restaurants. Mr. F. J. Francis.
February 4.—The International Congress of Architects at Paris. Mr. R. P. Spiers.
February 28.—Trimmings. Mr. E. W. Godwin.
March 14.—The Schools of St. Luke, at Ghent. Mr. W. H. James Weale.
March 28.—Party Walls: The Law and the Practice. Mr. Thos. Blashill.
April 18.—Members' *Soirée*.
April 25.—Ancient Paris. Mr. G. H. Birch.
May 9.—Notes on Measuring Old Buildings. Chiefly intended for students Mr. J. Neale.
May 23.—Late Wrought Ironwork. Mr. W. Penstone.
June 6.—A Tour on the Continent. Mr. H. W. Pratt.

CIVIL ENGINEERS AND DOUBLE COMMISSIONS.

We have been requested to give publicity to the following letter:—

Sir,—The Council of the Institution of Civil Engineers have been informed that a statement has been made to the Clyde Trustees, that civil engineers are in the habit of receiving double commissions,—that is to say, from their employers, and from the contractors engaged to do the work.

I am requested by the Council to give the most unqualified contradiction to this statement; and to add that, in the opinion of the Council, such a practice would be distinctly dishonest, and would constitute a disqualification for membership of this Institution.

James Forrest, Secretary.

Engineering Appointment.—Mr. Alex. Fraser, at present gas and water engineer, Barrow-in-Furness, has been selected out of above forty competitors, to be chief engineer of the Bolton Gas Works.

Books Received.

A Descriptive Treatise on Mathematical Drawing Instruments, &c.: with Hints upon Drawing and Colouring. By W. Ford Stanley, M.R.I. Fifth Edition. E. & F. N. Spon, London and New York. 1878.

The author of this useful little book, whose name is familiar to all who have to do with drawing-instruments, observed in the preface to the first edition of the work (published twelve years ago), that he had been convinced of the want of such a book by the fact that much of his time was occupied in answering letters requiring descriptions of the character and use of instruments which, on account of their extensive use by some of the profession, ought to have been known at least to all. The fact that his treatise has reached a fifth edition may justify the conclusion that this ignorance in regard to the subject must be to some extent enlightened by this time, for the book contains plenty of information, very clearly given in a brief and comprehensive manner, and we make no doubt that a continued sale will be found for it, on account of the convenience of having all the requisite practical information in regard to drawing-instruments and their work thus collected into a single small volume. The value of the book is increased by the considerate and critical spirit in which it is written. The author, who is mathematical-instrument maker to the Government, the Science and Art Department, the Admiralty, &c., brings to his task abundant practical knowledge, combined with judgment and common sense: his remarks furnish to some extent a critical guide as to the choice of instruments; the various instruments invented for some special object are compared, and their merits and demerits summed up, and they are recommended, or not, accordingly. Even in regard to implements which are his own special invention, Mr. Stanley, with admirable candour, states their faults or imperfections, leaving the reader to judge whether these are overbalanced by their advantages: a temper which is unfortunately not very common with those who write on matters in which they are personally and professionally interested.

Even to those to whom drawing-instruments have long been "familiar beasts," there is a great interest in looking through Mr. Stanley's pages, and taking a general survey of the many beautiful and delicate contrivances which have been made to assist the draughtsman in bringing his work as near to perfection as possible. The consideration of them tends to give one a great respect for fine and precise drawing, as an art in itself too much neglected and depreciated in the present day, among architects at least. The finest drawing at present,—"finest" in the sense of being precise and minutely exact,—is probably turned out by mechanical engineers, to whose work mathematical accuracy is a necessity. Some of the civil engineers keep up very fine drawing, and take a pride in it, but we believe that even in their profession drawings are in many cases (for railway work, for example) made with a roughness and want of finish which would have once been thought almost immoral. That this is the case with a large number of the architects, especially the younger generation, it is almost needless to remark. They look on it with the feeling with which Hamlet confesses that he had looked upon penmanship,—

> "I once did hold it, as our statists do,
> A baseness to write fair:"

though it appears he acquired the art nevertheless. There is no doubt that in the days when fine and exact drawing was *de rigueur* with the architect, there was a great deal of very dull designing drawn out with a care and labour worthy of a better cause. Perhaps it may be that the kind of temperament which goes to produce picturesque architecture is incompatible with that which leads to scrupulous care in drawing. There is no doubt which quality is of the most value to the world; still, we confess to being discontented sometimes with the slap-dash style in which what are called working drawings are so often turned out now: drawings from which no one could really "work," except by the help of the appended measurements, which cover such a multitude of sins. The perfection of a geometric elevation is attained when parts and details can really be scaled from it with accuracy, within the limits of dimensions that are distinguishable by the naked eye. In first-class drawing, the profiles of mouldings ought to be distinguishable on a very small scale, and with the old schools of architectural draughtsmen it was an object that they should be so. Nowadays, a sort of approximate scratching is made on the profile of a cornice, or the longitudinal lines are drawn through, "and there an end."

We may just make some brief comments on one or two points that strike us in Mr. Stanley's book. In the chapter on the most used of all drawing instruments, the drawing-pen, we notice a pen with a crank-shaped handle, which the author says has much pleased some draughtsmen, though we cannot think it would be so steady in working as the straight handle. The object is to keep the hand from interfering with seeing the action of the pen while drawing a line. The very simple improvement of having a square holding-piece on the ivory handle, so as to preclude any danger of the pen turning at all in the hand while making a line, was of real value, and we have been surprised not to find this form of handle universally used. There is one little direction in regard to the pen, by the way, which may be amended; it is said that the pen should be wiped by "passing a piece of folded paper" between the nibs before putting it away; it should be *blotting*-paper: ordinary paper does not bring out all the ink. The patent needle-holder figured at the end of the following chapter is worth attention, and would save a good deal of trouble.

In the chapter on "Dividers and Compasses" we very much question whether the application of wax to the working surfaces of the joints in these instruments is not a degeneracy from the highest traditions of workmanship; our impression is that the best work ought to be, and used to be, independent of this aid for the perfect action of the joint. The author's "Brick Gauges," for pricking off the proportionate thicknesses of brick walls for the most usual scales, are useful little things, and might tend to ensure greater accuracy in drawings in this respect; one often finds on a plan walls of which it is difficult to say whether they are meant for 9 in. or 14 in. The author has a theory of his own as to the best form of divider points for keeping sufficiently sharp and not piercing the paper; the extreme end is formed in a rather obtuse cone, of which an enlarged illustration is given to show the make. We agree with the author that points are often made too thin and sharp in these instruments; and we should go much further than he does in the denunciation of movable needle-points; they are always giving trouble through not being perfectly firm. We do not much admire his model of spring bows: the handles are too short, and they are not elegant in appearance, and we must be allowed to add that our practical acquaintance with them has not had satisfactory results. In the matter of appearance, by the way, we are often struck with the want of elegance in the proportion and finish of instruments in the present day, as compared with the best make of *the* old firm, Elliott's.

An instrument for satisfactorily and easily striking arcs of large surfaces where they cannot be struck from the actual centre is a great desideratum. How much time one has known to be lost over the describing of one such arc in a drawing, where it was necessary to find a surface large enough for the radius, and then to manage some sort of *extempore* means of describing the arc. Mr. Stanley delineates a "centrograph," so called, apparently, *quasi lucus a non lucendo*, because it will draw an arc of a circle without finding the material centre, the instrument being set for the required arc. He admits, however, that it is far from perfect in its operations, so far as readiness and ease in use are concerned. The Helicograph, an instrument for producing spiral lines, has, it is to be feared, lost much of its use and glory now that the Ionic volute is so seldom used. A section is devoted to the "antigraph," a very elaborate-looking instrument for drawing a symmetrical design on either side of a centre line, simultaneously, and with supposed mathematical accuracy; but as this entirely depends on its travelling straight on its wheels, we have not much faith in it, nor in any drawing-instrument in which wheels or rollers are an element; they may at any time take a slip which is probably unnoticed by the draughtsman until he finds out that his result is inaccurate. The roller parallel-ruler is a most useful instrument, no doubt, for the subordinate lines of a drawing,—more so, in fact, than it generally gets credit for,—but no one can for a moment trust it for

main lines, and it requires continual correcting and testing by reference to these. In the same way Mr. Stanley proposes that the rolling centro-linead, with wheels of different (proportional) diameter, should be worked always from a fixed starting-line on the drawing. We should never trust it, even under those circumstances, where accuracy was an object.

Our space will not allow us now to go further into detail here in regard to this very useful book, though some of the special subjects suggest a great deal which might perhaps be said on another occasion and in another form. We may mention, in conclusion, two little instruments which Mr. Stanley has been good enough to send us, intended for assisting in perspective sketching: the one, looking like a small pocket centrolinead of ivory, is intended to enable the sketcher to get the precise apparent angle formed by two lines having different vanishing points, and transfer it at once to the paper; and the other, a foot-rule with very large figures, is intended to be held at arm's length and to measure the apparent relative lengths of lines; the edge of the rule being notched at each figure to facilitate its projection by the eye against the object to be drawn, while a piece of cord attached to the centre, with an ivory button at the other end to be held between the teeth, ensures the rule being kept at the same distance from the eye during the measurement: in fact, it is the old "dodge," so familiar to artists, of the pencil and pocket-handkerchief, in a more genteel form. We do not recommend the habit of trusting to these artificial aids in sketching (nor, we gather, does the author), but in making a view of a difficult interior they may lawfully save some time and trouble by enabling the sketcher to be certain of his main lines and dimensions before filling in the detail.

CONTRACTORS' CLAIM FOR EXTRA WORK, HYTHE.

Sir,—I observe in your paper of the 5th instant a paragraph which does a great injustice to Messrs. Lucas & Aird. No claim for upwards of 10,000*l.* extra has ever been made or sent in.

The facts are that Messrs. Lucas & Aird undertook the drainage, and although no doubt considerable losers, carried out the works in a most complete and satisfactory way. The cost of the extra pumping, with other works which the contractors submitted for the consideration of the Council, amounted to 3,500*l.*, not 10,000*l.*, as stated, and even this was not submitted as a claim; but the Council were asked, for the reasons stated, to meet the contractors to that extent. The Council expressed no opinion as to the mode of carrying out the works involving the additional cost, or as to the course the contractors would have pursued had the contract been a favourable one. General regret was expressed that any loss should have occurred, but in the presence of the contract, and of the engineer's report, the council felt they were powerless.

George Wilks, Town Clerk.

*** Our paragraph was condensed from statements reported to have been made at a meeting of the Town Council.

PARIS EXHIBITION.

Sir,—We note in your last issue that Messrs. Howard state that the stove made by us for the Paris Exhibition was exclusively their own. This we deny, as previously to our undertaking to make it for them, it was expressly stipulated we should be joint exhibitors.

Verity Brothers.

*** We cannot carry this matter further.

CHURCH-BUILDING NEWS.

Barrow-in-Furness.—On the 26th ult. four new (temporary) churches, built by private subscription, were opened in Barrow-in-Furness. Previously to the erection of these new edifices there were but three Episcopal churches in the town for a population of 4,000 people. Two of the old churches were built and endowed by the Dukes of Devonshire and Buccleuch, and several gentlemen connected with large works in the town, while a third,—St. Paul's,—was raised by public subscription. The Bishop of Carlisle, in a sermon preached two years ago at Barrow, pointed out how essential and necessary it was to extend the church accommodation in the town, and a movement was set on foot by Sir James Ramsden and other gentlemen with this object in view. After mature consideration, it was determined to build four new churches in various parts of the town, and to dedicate them to the four Evangelists. A sum of 24,000*l.* was required to carry out the scheme, each church and parsonage to cost 6,000*l.* The Duke of Devonshire gave 12,000*l.*; the Duke of Buccleuch, 6,000*l.*; Mr. H. W. Schneider (Mayor of Barrow), 1,000*l.*; Sir James Ramsden, 500*l.*; and the remaining 4,500*l.* have been given by ladies and gentlemen interested in the large industries which have been the means of creating the town. It was resolved that temporary churches should be erected in the first place, and permanent parsonages, but it is ultimately intended that permanent churches shall take the place of the temporary edifices. The churches are constructed of wood and brick, and embrace the ordinary church arrangements, — chancel, nave, and north and south aisles. Their extreme length is 102 ft., and their breadth 50 ft. The sittings are open, and afford accommodation in each church for 520 worshippers. The length from the floor line to the top is about 40 ft. The churches are lighted from the clearstory. Messrs. Paley & Austin, of Lancaster, were the architects.

Crofton (*Hants*).—This church, built in a central situation, on a site the gift of Mr. Montague H. Foster, to take the place of a very small and dilapidated structure some distance from the population, has just been completed, and was consecrated on the 2nd inst. by the Bishop of Winchester. It is built of flints, with Bath stone dressings, lined on the interior faces with Isle of Wight primrose-coloured bricks, pointed with pink mortar, and consists of a nave of six bays, with clearstory and north and south aisles. There is a raised chancel, having vestry to the north and organ-chamber to the south, while at the north-west angle is the base of a tower, over which is a temporary cot, with one bell. The church holds 550 persons, and is fitted with stained deal open seats. The roof is open-timbered, with curved ribs resting on carved stone corbels, that to the chancel being boarded and panelled. The reredos, the gift of the Marchioness of Bath, is of Canterbury tile, with super-altar of alabaster, all executed by Messrs. Minton & Hollins. There is a handsome brass lectern, the gift of Lady Sykes. The organ (by Bevington) is the gift of Sir F. H. Sykes, bart. The font is of Caen stone, with shafts of Irish marble, and is the gift of the Hon. Miss Baring. The pulpit is of oak, executed by Mr. Hammer. The floors are paved with tiles, also by Minton; and there is a complete heating apparatus by Mr. Grundy. The style is Transitional, of the thirteenth century, freely treated. The builders are Messrs. Plummer & Gamblin, of Fareham; and the whole has been carried out from the designs of Mr. T. Goodchild, architect.

Grosmont.—The parish church of St. Nicholas, Grosmont, Monmouthshire, was re-opened on the 19th ult., after the restoration of the transepts. The church had for many years been fast going to decay, when the late incumbent commenced the restoration of the chancel, and the Eleanor chapel on the south side, which were restored some years since, under the superintendence of Mr. J. P. Seddon, architect. At this time the tower arches, which had been the chief source of danger to the edifice, were threatening to fall, and they were carefully shored, up and rebuilt. After this very little was done for some years, when the present incumbent, the Rev. R. J. Duncan, caused plans to be prepared by Messrs. James Seward & Thomas, architects, Cardiff, for the restoration of the whole remaining portion of the edifice. The work just completed includes the partial re-erection of the transepts, the re-roofing, and fitting them with open-timber ceilings; new ceiling to the tower, and a new stone and alabaster pulpit. The contractor for the work to the transepts is Mr. Thomas James, of Abersychan; the cost has been about 500*l.*

London.—The Church of St. Augustine and St. Faith, which stands at the corner of Watling-street and Old Change, has been repaired and decorated under the superintendence of Mr. A. W. Blomfield. The south and west galleries have been removed, and by throwing the lobby into the church almost as many seats have been gained upon the floor as were formerly available in the galleries. The windows have been improved. As to the decorations, the roof is treated principally with greyish blue, white, and gold; the walls with sage-green, relieved by bands of other colours, charged with festoons of fruit, flowers, &c. The reredos has been cleaned, restored, and coloured, and upon its panels has been painted a picture of the Ascension, flanked by figures of St. Augustine and St. Faith. A mosaic pavement has been laid in the sacrarium by Messrs. Simpson & Co. The decorations have been designed and executed by Messrs. Campbell & Smith, and the builder's work is by Mr. Walden.

Monteith.—The new parish church at Port of Monteith has been opened for worship. The style is that of the middle of the thirteenth century. The architect was Mr. Honeyman, of Glasgow, and the contractors were Messrs. Lyall & Leckie (Glasgow), masons, joiners, and plasterers; Buchanan (Kippen), slater; and Carson (Stirling), painter. The stained glass of the east window is by Adam, of Glasgow.

Bassenthwaite Lake.—On the 24th ult. the Bishop of Carlisle consecrated a new church and burial-ground at the village of Hause, at Bassenthwaite. The church, which is dedicated to St. John the Evangelist, comprises nave, 62 ft. by 25 ft.; apsidal chancel, 24 ft. by 21 ft.; organ-chamber, vestry, south transept, with bell-tower and spire at east angle 90 ft. high. The external walls are faced with light grey shoddies, and all dressings are in Howrigg stone, from near Carlisle, the roofs being covered with green Langdale slate. Internally, the walls throughout are faced with rubbed Howrigg stone. The whole of the internal woodwork, sittings, doors, and ceilings is in oak. The nave has a boarded ceiling, wagon-headed, with groin ribs, and the chancel is vaulted with oak groin vault and moulded ribs and carved bosses, roof-ribs springing from attached moulded stone shafts and foliated caps. The style adopted for the church is of the end of the twelfth century, and the character of the work is (for that locality) of an unusually costly character. The cost has been chiefly defrayed by Mr. J. Boustead, of Armathwaite Hall. The architect is Mr. Daniel Brade, of Kendal, the design having been selected in competition a few years since.

SCHOOL BUILDING NEWS.

Little Hulton.—New schools in connexion with the Church of St. John the Baptist, Little Hulton, have been opened by the Countess of Ellesmere. The buildings have been erected of brick, at a cost of 1,000*l.*, from the design of Messrs. Medland & Henry Taylor, architects, Manchester, and consist of one large room for boys and girls and another for infants, each having a separate entrance.

Salford.—A new Wesleyan school is being erected in New Park-road, Ordsall Park, Salford. The building, which is designed in the Gothic style, will be 52 ft. by 37 ft., and 28 ft. from the ceiling to the floor. The walls will be of brick, with stone facings, and there will be two stories, the upper story containing a gallery. Three rooms, suitable for class meetings, are to be added to the building. Accommodation is provided for 350 children, and the cost will be 1,700*l.* The schools are being built by Messrs. Statham & Sons, Pendleton, from the designs of Mr. Crowcroft, architect, Manchester.

Whittington.—On the 24th ult. a new Church school for the parish of Whittington, Lichfield, were opened. The building, which will accommodate forty boys, has cost 425*l.*, and has been erected by Mr. G. Moody, builder, Whittington, from designs supplied by Mr. Ewan Christian.

Oswestry.—The Oswestry Grammar School has been undergoing renovation, and a new wing has been added, which was opened on the 7th inst. by the Earl of Powis. The old school building consisted of a school-room, 50 ft. by 20 ft.; a class-room, 20 ft. by 14 ft.; a dining-room for the boarders, 27 ft. by 20 ft. (which was also used as a class-room), a dormitory over, known as the barracks, 40 ft. by 20 ft.; and a small room adjoining, the height being 6 ft. 9 in. at the lowest, and 9 ft. at the highest part. The other dormitories were at the top of the head-master's house, and were only 7 ft. high. These have now been raised to a height of 9 ft. 6 in., and one of them is turned into a sick-room, with nursing appliances adjoining, so that a boy showing any symptoms of illness can be immediately isolated. The new school buildings consist of the boarders' day and dining-room, 27 ft. by 20 ft.; of the four class-rooms (three of which are made out of the old school-room) on the ground-floor, two 20 ft. by 14 ft., and two 20 ft. by 20 ft., and 14 ft. high, opening into a corridor 6 ft. wide, at the end of which is a stone staircase leading to the dormitories; a boot-room, a master's sitting room, and a schoolroom 49 ft. by 22 ft., divided in the centre by folding-doors, 15 ft. high. From this a passage leads to the laboratory, which is a new feature of the school. The total cost of the works was 4,184*l.* Mr. W. H. Spaull, of Oswestry, was the architect; Mr. R. Yates, of Shifnal, the general contractor;

and Messrs. Lewis, Brothers, of Oswestry, the painters and decorators. The schools now afford adequate accommodation for 150 boys, including 40 boarders.

SCHOOL BOARD SCHOOLS.

West Vale, Halifax.—New Board schools are being erected at West Vale, from the designs of Mr. Horsfall, of Halifax. The boys' school will accommodate 150, girls' school 150, and infants' 200. The cost is estimated at 6,270*l.*

Liverpool.—The new Harrington Board schools, in Stanhope-street, were opened on the 23rd ult. The schools are in three departments, on three separate floors. They consist of schools for infants, girls, and boys, and are calculated to accommodate 600 children. The boys' and girls' department are fitted with Reade's patent long desk, with adjustable form, the infants' department being provided with the ordinary dual desk. In the basement, the whole area under the school, excepting the space occupied by a committee-room, is devoted to a covered playground. The architect was Mr. T. Mellard Reade, C.E., the architect to the Board; the builders were Messrs. Alexander Rule & Son, of Liverpool; the clerk of the works, Mr. James Peers; the heating apparatus was supplied by Mr. Harlowe; and the ventilation carried out by Potts's Patent Cornice Ventilating Company.

Old Basford.—New Board schools at Old Basford have been opened by the Nottingham School Board. They are situate in North-street, and are slightly Gothic in character, the materials used externally being Bulwell, faced with Hollington, stone. The whole of the schools are ventilated on "Tobin's" system, Galton's stoves being used for heating. The architect was Mr. E. T. Ettwell, of West Bromwich; the contractor, Mr. Thomas McCulloch, of Bulwell; and the clerk of the works, Mr. Bunting. The cost of the buildings is estimated at between 6,000*l.* and 7,000*l.*, but with the purchase of the land the cost will be 10,000*l.*

Newtown.—On the 30th ult. the Newtown schools of the Gelligaer School Board were opened. The contract was undertaken and carried out by Mr. William Bevan, Deri, for 490*l.* The architect was Mr. John Williams, Merthyr Tydfil. The schools are built to accommodate 108 children.

The Bridgwater School Board have accepted an amended and reduced tender of Messrs. Chedzoy & Son, of Bridgwater, amounting to 3,224*l.* 9s. 3d., for the erection of their new schools in Albert-street for 700 children. Mr. J. Parker, borough surveyor, is the architect, the cost per head being 4*l.* 12s.

Miscellanea.

The Right Hon. A. S. Ayrton, whilom First Commissioner of Works, is now wooing the electors of Northampton, and in a speech he made there last week he said:—

"When I accepted that office I at once asserted my opinion that the duty of the Commissioner was not to embark in all sorts of fantastical ideas about art, and spend the public money as if he were a millionaire, or as if he were disposing of it according to his own ideas, but was to spend it as a trustee for the people; to see that the right sort of people were employed, and, when they were employed, to exact from them a full and satisfactory discharge of their duty. Of course, I gave great offence, and unfortunately I found that this department had hitherto been conducted on the singular principle that the great duty of the First Commissioner of Works was never to take upon himself any responsibility, but that he should pay some eminent persons acquainted with the sciences and arts, and put the responsibility upon them, so that the First Commissioner had nothing to do but refer to them when any question arose. I objected to that. I said, 'No; the responsibility rests with me, and I will perform my duty.'"

The Receipts at the Paris Exhibition.—The total amount received for admission to the Paris Exhibition during September was 108,424*l.*, or about 3,614*l.* per day, as against 58,929*l.*, or 1,964*l.* per day for the corresponding month at the Exhibition of 1867. The total receipts for the first six months at the Exhibition of 1867 were 311,744*l.*; whereas the receipts for the first five months this year amount to 390,638*l.*, or nearly 79,000*l.* more than was taken up to the end of September, 1867, when the Exhibition opened a month earlier than the present one.

Bethnal-green Improvement. — Messrs. Nowell & Robson have made a commencement with the works of the contract (lately undertaken by them for the sum of 19,490*l.*) for forming a new line of thoroughfare from High-street, Shoreditch, to Gibraltar-gardens.

Assyria and Babylonia.—Mr. Hormuzd Rassam is about to start upon a second and much extended tour of exploration. Mr. Rassam has succeeded in obtaining a series of sufficiently open permits to enable the new expedition to assume the nature of a roving exploring party. The new firman includes the whole of Mesopotamia, embracing the region around Mosul—that is, the sites of Nineveh, Kalakh, and the ancient city of Assur, the site of which is marked by the mounds of Kileh Shergat. Mr. Rassam will land at Alexandretta, and travel across country to Aleppo. Here he will make the necessary preparations for commencing explorations. The chief seat of these Syrian explorations will be on the mounds of Jerabolus, which mark the site of the ancient city of Carchemish, the Hittite capital. The mounds of Jerabolus as described by Maundrel, Pococke, and others who have visited them, appear to exhibit considerably more external evidence of buildings buried beneath them than is met with in the majority of the Assyrian ruins. The statements in the inscriptions of the Assyrian kings as to their having erected monuments in the Hittite capital, and the close trade and commercial connexion between Carchemish and the chief cities of Assyria, afford every reason for Assyriologists to expect the discovery of some bilingual key which will enable them to solve the mystery of the Hamathite inscriptions. Under the extensive privileges of the new firman explorations will be carried on in the districts of Southern Assyria as well as in Babylonia. The mound of Kileh Shergat, about forty miles south of Nimroud, which marks the site of the metropolis of the early Assyrian empire, the city of Assur, will be explored. The mounds of Kileh Shergat are larger and more lofty the those of Koyunjik or Nimroud, and evidently cover the sites of several important edifices. In Babylonia the explorations will be directed to a thorough examination of some of the temple sites, such as the Amran and Babel mounds. There is one very important point in Babylonian topography to the solution of which Mr. Rassam will direct particular attention: this is the site of the famous royal "record office" or "Babylonian Bank," where were discovered the large collection of trade and commercial tablets. These Babylonian tablets, which represent the monetary transactions of a firm trading in the name of Egibi & Sons, were discovered in 1875 by some Arabs, and already somewhat over 3,000 have found their way to this country. They represent every branch of commercial and fiscal transaction, and furnish every detail as to the corn produce of the "most fertile of lands." Their annals extend from the commencement of the reign of Nabupalassar until the end of the Persian empire—the latest record being a tablet dated in the reign of Artaxerxes. It is in Babylonia that the roving commission which this new expedition will assume will be of the greatest importance. For so numerous are the sites in this southern Mesopotamian district which are marked by sandy *tells* that slight excavations, recovering only a few of the inscribed bricks or terra-cotta cones, will suffice to identify some of the ancient cities or towns which were once scattered thickly over the plain. One of the sites, where it is to be hoped exploration will be made, is in the mounds of Tel Ibrahim—the site of the city of Kutha, the great sacred university of Babylon.

Dublin Sanitary Association.—The executive committee met on the 10th inst. A letter was read from the secretary of the Local Government Board, stating that it was not intended to take evidence as to the general sanitary condition of Dublin inquiry [now just commenced] into the application of the corporation for an alteration in the incidence of charge with reference to the expenditure for sanitary purposes in the city. Attention was directed to the death-rate in the city, which was 26·5 per 1,000, as compared with 19·8 in London, and 17·3 in Edinburgh.

Bradford.—The site of Christ Church, in Darley-street, Bradford, being required for street improvements, the site and the church have recently been purchased by the Bradford Corporation at the price of 10,000*l.* The church was built in 1815. A new site has been secured for Christ Church, at a distance of a quarter of a mile from the old site, and on Saturday afternoon the foundation-stone of the new church was laid by Mr. F. S. Powell. The estimated cost of the building, including the site, is about 11,000*l.*

Plaster of Paris.—M. Landrin has just communicated to the Academy of Sciences the results of long-continued studies relative to the different qualities of this substance, and (according to *Galignani*) he finds that the more or less rapid setting of the plaster is due to the mode in which it is burned. Its properties are very different when it is prepared in lumps or in powder. The former, when mixed with its own weight of water, sets in five minutes, while the latter, under similar conditions, takes twenty minutes. The reason probably is that plaster in powder is more easily burned than when it is in lumps, and what tends to prove that fact is that when the latter is exposed longer than usual to the action of fire it sets more slowly. Gypsum, from which the plaster is made, when prepared at a high temperature, loses more and more its affinity for water, retaining however its property of absorbing its water of crystallisation. Plaster heated to the red, and mixed in the ordinary manner, will no longer set; but if, instead of applying the ordinary quantity of liquid, the smallest possible portion is used, say one-third of its weight, it will set in ten or twelve hours, and then it is less porous, and becomes extremely hard. To prepare plaster for moulding it must be burned slowly for a long time, sufficiently to drive off all its water, and for its molecules to lose a part of their affinity for the liquid. M. Landrin stated that a similar result could be obtained by other means. If the plaster is exposed to the fire of the kiln for a time short enough to allow it to retain seven or eight per cent. of its water, it is useless, as it sets almost immediately. If, however, the burning is again resumed, the substance soon loses its moisture, and, if then exposed to the air, it very rapidly retakes its water of crystallisation, and then absorption continues more slowly. It can then be used; it sets slowly, but acquires great hardness.

Technical Education and the London Livery Companies.—At a recent meeting of the Court of Common Council a report was submitted by the General Purposes Committee, on the reference of the 6th of June last, to consider the letter of the joint honorary secretaries of the Committee of Livery Companies of London, and recommending that, whilst the Corporation should not commit itself to an approval of the details of the scheme, or to the amount and method of expenditure, as set out in the report of the Committee of the Livery Companies, it is desirable the Corporation should express its approval of the general outlines and objects involved in the report, and should identify itself with the Livery Companies in endeavouring to give effect thereto. Mr. Deputy Fry, in proposing the adoption of the report, said the committee were favourable to local trade schools, rather than a central institution. Persons attending the former would receive elementary instruction in the principles of science and art by teachers having a competent knowledge of the actual practice of those trades as well as of the scientific and artistic principles to be applied to them. As to the central institution, the committee felt that rather too much had been made of this point. In the central institution the studies were chiefly physics, chemistry, mechanics, and art, while in the local trade schools instruction would be given to students by means of lectures and evening classes, and the discussion of important discoveries in trade. It was contemplated to provide exhibitions for meritorious students to assist technical classes already established, and aid efforts made or to be made in special manufacture, and in furtherance of technical education; that prizes and premiums should be offered, and that the apprentices should be rewarded with fees. The report was adopted.

School Board Drawing Exhibition.—The drawing exhibition is to be held at the Saffron-hill Board School, Farringdon-road. The exhibition will be opened at ten o'clock in the morning of each day, and closed at half-past nine. The drawings for exhibition are to be delivered at the above school on Saturday, November 2nd. In exhibiting the drawings, those of pupil teachers are to be displayed separately from those of the children.

Cardiff Waterworks.—The Cardiff Town Council have decided to purchase the local waterworks for a sum of 300,000*l.*, and a committee has been formed to deal with the company as to the manner in which payment should be made.